The Builder.

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ILLUSTRATIONS.

The New County Public Offices, Fishergate, Preston.—Mr. Littler, Architect 336
Plan of the New County Public Offices, Preston 338
Marina House, Walmer, Kent (Double-page Engraving).—Mr. James Neale, F.S.A., Architect 340, 341
The Harris Free Public Library and Museum, Preston.—Mr. James Hibbert, Architect 343
The New Provincial Estates House, Hanover.—Herr F. Wallbrecht, Architect 345

CONTENTS.

The Social Science Association 325
The Art of the Caliphs 326
Some Practical Notes on the Seasoning of Building Woods 327
The Genius of Sir Christopher Wren 327
The Proposed Crystal Palace for Paris 329
The British Association on the Draught of Chimneys: a Formula and Table for Chimney-draught 329
Continental Gatherings 330
Taste in Furniture 331
The Engineering Congress at Magdeburg 332
Saltburn-by-the-Sea 333
The Preservation of Ancient Monuments in Switzerland 333
The New County Public Offices, Fishergate, Preston 333
The Present Situation of the Building Industry in Germany 334
The Harris Free Public Library and Museum, Preston 347
Marina House, Walmer, Kent 347
The New Provincial Estates House, Hanover 347
The Future of Lighting and Heating 348
The New Public Hall, Preston 348
Meeting of the International Sanitary Congress, Geneva 349
The Circulation of Underground Waters 349
Discoloration of "Southampton Water": Is it Due to Sewage? 350
The Vyrnwy (Liverpool) Water Scheme 350
Cement, "Vulcan," and Asphalte Floors 350
The Netherfield Gypsum Works 351
A Hint to Hastings 351
The Guild-merchant Processions at Preston: Representatives of the Building Trades 352
Building Patent Record 352
Right of Support by Adjoining Walls: Feoffees of St. Olave, Jewry, v. Finn and Metropolitan Board of Works 352
The New Municipal Buildings of Glasgow: Exhibition of Sketch Designs 353
The Preston Guild and the Opening of a New Railway 353
Railway Clocks 353
Fog Signals 353
School-Board Schools 353
Books: Dickson's Practical Organ Building (Crosby Lockwood & Co.); Pollard's Handbook and Guide to Preston (Oakey); Variorum 353
Disfiguring Buildings 354
Miscellanea 354

The Social Science Association.

THE present Secretary of the Social Science Association, Mr. J. L. Clifford-Smith, has published, as a kind of commentary on the occasion of the twenty-fifth anniversary of the Association, a small book giving an account of the founding of the Association and of the work it has accomplished. Mr. Clifford-Smith has proved himself a most able and energetic secretary, upon whose engagement the Association may be congratulated; and therefore it is not from any want of recognition of his real merits in such a post that we express some dissatisfaction with the little volume in question, which, on his part, is an entirely extra labour, outside of the necessary duties of his office, the good intention of which we fully appreciate. But the account appears to have been compiled under rather a strong bias towards the legal side of the work of the Association,—a bias, perhaps, furnished partly by those who have supplied the author with some of the information and assistance which he acknowledges, and perhaps arising partly from the fact that the plan of the book seems to have been to dwell especially on those portions of the work of the Association which have led directly to special legislation. But this, though it may be the species of work most easily tabulated, certainly does not represent all that the Association has accomplished; and we complain that its sanitary work, and the influence which it has exercised on sanitary improvement, have been far greater and more important than the reader of this chronicle of the Association would be led to suppose; and in so far the said chronicle is unsatisfactory and rather misleading.

The Social Science Association originated, our readers may be reminded, in the house of Lord Brougham, who was president of several of the Annual Congresses, and was, in fact, appointed the first provisional president, Mr. Hastings, the president of this year, being the first general secretary. The specified object of the Association was "to afford to those engaged in all the various efforts happily begun for the improvement of the people an opportunity of considering social economics as a great whole." The advantage of such a generalisation of the subject and of opportunities of discussion was fully acknowledged at the time; and with the continually increasing complication of social life the necessity for this united action and general discussion certainly cannot have decreased, though some part of the work proposed may have been definitely accomplished as far as it is possible for the present to carry it. In regard to the classification of subjects treated by the Association, it may be observed that during the first three years of its existence the classification was under five heads, under the respective titles,—(1), Jurisprudence and Amendment of the Law; (2), Education; (3), Punishment and Reformation; (4), Public Health; and (5), Social Economy. A section for "Trade and International Law" was added to these in 1860; but in 1863 the secretaries were directed to consider and report to the Council "whether any and what alterations are desirable in the designation and business of the departments." A few words from the report presented may perhaps advantageously be quoted here. The questions of "designation" and "business" were taken separately, and in regard to the first it was suggested that:—

"The fundamental conception of the Association was that of a united body dealing with the science of society as a whole, but divided, for purposes of practical utility, into so many divisions as would answer to the leading divisions of that science. The style of 'departments,' rather than 'sections,' was proposed for these divisions, to show that they were intended not to be mere temporary adjustments, but to form a true and exhaustive nomenclature of the permanent heads of Social Science. It was supposed from the first that it might become expedient from time to time to divide more than one of the departments into sections, which might be accommodated with separate rooms at the annual meetings, and have the benefit of separate secretaries and committees. But it was also an essential element of the original idea that the division into departments should be scientific, and therefore exhaustive and final, and that any further development should take place by sub-division, and not by anomalous additions." In pursuance of this idea, the distribution was suggested into the departments of Jurisprudence, Education, Health, Economy, and "Art," or (as the last was defined) "the æsthetic recreative life of the people." These heads, the secretaries thought, seemed to exhaust the entire conditions of society; and it will be observed that the idea of setting apart a department for the consideration of artistic subjects, though only recently adopted, was officially suggested at an early stage in the history of the Association.

This idea of representative "departments," to be subdivided when necessary into "sections," has been adhered to, and the "Society for the Amendment of the Law" having been shortly after this date incorporated in the Social Science Association, the first department assumed the title which it still retains,—"Jurisprudence and Amendment of the Law," with sub-sections for International and Municipal Law and Repression of Crime. The other departments remain as suggested in the above statement. It was the suggestion at the time that the idea of a department for art should first be experimentally tried by forming a section of the Education Department for the consideration of artistic subjects. This, however, was not done, and the subject dropped until the formation of the Art Department in 1876. We confess we have often had our doubts whether the subjects now discussed in the Art Department might not have been as well and even more suitably classed under a section of the Education Department. The first subject for this year in the Art Department, for instance,—the Royal College of Music,—is really an educational subject; and artistic questions can only be treated in reference to their bearing on popular education or amusement. If the Department proceeded to deal with subjects more directly connected with artistic style and design, it would then be going out of the proper path of the Association, and assuming the functions of a lecturer on art,—a mistake which, in fact, has once or twice been made.

In regard to the two departments with which we are especially concerned, those relating to Health and Art, the questions to be discussed in the former at this year's congress are almost entirely questions of administration, and not of sanitary arrangement or construction; or where they are not merely administrative, they are essentially medical, and therefore touch less upon our special province than is usually the case. Of the questions to be discussed in the Art Department, two are of rather special interest. One of these is on the proposed Royal College of Music, the most important move in musical education in this country which has been made; and though this, as already observed, is a subject which might not unreasonably be supposed to belong as much to the Education as to the Art Department, we have very little doubt that music will receive more intelligent and sympathetic treatment in the latter than it would have been likely to receive in the former department, as at present constituted. The paper on this subject must, however, we presume, be rather one conveying information or making suggestions than raising a discussion, as the establishment of the college is now a foregone conclusion, and probably will, in every way, be advantageous to the promotion of musical education, though it will not necessarily do anything to quicken into new life an art which we fear has now pretty well achieved what it can achieve. The third question, in regard to the limits of conservatism to be observed in the treatment of ancient buildings, deals, we need not say, with a subject which has been hotly discussed of late years, and on which some calm and considerate criticism is very much needed; for at present the controversy seems for the most part to have oscillated between vandalism,—the vandalism either of reckless pulling down or of reckless restoration,—on the one hand, and bigoted and unpractical

opposition to all restoration on the other hand. The advocates of the preservation of ancient buildings seem to ignore the present altogether, and to put aside all practical considerations in connexion with the present use of buildings, and all idea of the possibilities of an art of to-day, in favour of preserving intact every crumbling shred of the art of the past, good or bad; the antiquity of even a century being sufficient to render everything admirable. We are, both by conviction and tradition, as much opposed to wanton destruction or wrong treatment of old buildings as any one could be, but the present has its claims as well as the past, and we hope they will not be lost sight of in the discussion of the subject at Nottingham.

The second question of the Art Department, "In what way can the influence of art be best brought to bear on the masses of the population in large towns?" belongs to a class of questions which have been repeated in somewhat varying terms ever since the Art Department was started, and to which there is little hope of finding a definite answer; though we do not by any means say that on that account it is not worth while to ask the question. It is the repetition, in fact, of the almost hopeless query which arises again and again in the minds of those who contemplate the mass of struggling and unhealthy and unbeautiful life in our large towns, how shall we make this mass of human life more good, more healthful, and less ugly? The more fortunate among us find the contemplation and enjoyment of beauty and of beautiful things one of the chief and highest pleasures of our lives; the sources of this enjoyment are open to us, but they are not open to the poorer masses of the population; and if they were, where is the intellectual culture to appreciate and enjoy them? How are we, without entering on a system of artistic "pauperising," to bring within reach of the poorer class the sources of artistic enjoyment, and how, if we can accomplish that, can we give them eyes to see and heads to understand? The question is continually before us; and, as we have said, no definite answer, no infallible system, seems possible in regard to it: we cannot suggest any special course, and say "Do this, and you will humanise and refine the masses." Hence this class of question is sometimes rather too hastily regarded as vague and unpractical. It is so, doubtless, if we expect definite answers to it, or to find a definite course which will operate as an immediate and certain specific. But each answer given to the question may be one suggestion that may be acted upon by some persons, in some places, and may produce its effect, slowly and imperceptibly very likely; for in such a matter as this we can only expect to progress little by little; but it does not follow that any words spoken on the subject are thrown away because their immediate practical bearing is not very obvious. Let the question be discussed as much and as often as possible, and we shall by degrees get nearer the solution of it. One reason for being less hopeless about it than we might otherwise be is this, that it is after all not so much a question of educating people to understand art, as of bringing art to them to be understood. For art is, to a great extent, her own teacher, and familiarity with works of art has a happy tendency in itself to awaken the feelings and perceptions necessary for their enjoyment.

THE ART OF THE CALIPHS.*

ALLOWING fully for that Eastern exaggeration which must always be taken into account in reading of things Oriental, we have ample evidence of the extraordinary refinement of the surroundings of a caliph of the eleventh century, at a time when our Western civilisation was indeed almost entirely dependent for its luxuries on the East.

In these days, when we hear so much about decorative art, the suggestions for design given by the Arab historian in his relation of the contents of the pillaged caliph's palace are alone sufficient, one would think, to inspire many a work of beauty. Decorative artists, indeed, the Arabs seem to have been born, were it not that we trace in the conditions of their existence the causes of this characteristic feature of their art. With the luxury of the caliphs in Spain, all who have read in Washington Irving or elsewhere of the wonders of the Moorish rule in the Peninsula are familiar. A passion for dress and ornament pervaded all classes. That of the princesses and ladies of high rank, says Al Kattib, one of their own writers, was carried to a height of luxury and magnificence that bordered on delirium. They wore girdles and bracelets and anklets of gold and silver, wrought with exquisite art and delicacy, and studded with jacinths, chrysolites, emeralds, and other precious stones. The Moorish cavaliers were scarcely less extravagant. Their dress, arms, and horses' trappings were of the most gorgeous description. All this warlike luxury of the youthful chivalry was encouraged by the Moorish kings, who ordained that no tax should be imposed on the gold and silver employed in these embellishments, and the same exception was extended to the bracelets and other ornaments worn by the fair dames of Granada.*

In their immediate surroundings we have evidence that the Arabs early indulged in the most excessive luxury. The refinement and beauty of Persian art, after the conquest of Persia by the Moslems, influenced the whole of the Mohammedan empire. The passion of the descendants of the original simple Arab shepherds for beautiful objects, and especially precious stones, was insatiable. European travellers as late as the seventeenth century state that they could ensure larger sums for gems in the East than even at home.† Rich as had been the yield during centuries of the mines of Asia, when the New World was discovered, its precious stones soon found their best market in the East, though already Moslem art was on the decline.

Authorities divide the history of the Arab art, or rather architecture,—on which depend, it will be found, throughout all history the decorative arts in general,—into three periods. According to Gwilt, the first period stretches from the foundation of Islamism in the seventh century down to the ninth century, the period of Byzantine influence; the second extends to the end of the thirteenth century; and the third to the fall of the Saracen power in Spain in 1492.‡ But these divisions are applicable alone to the Moorish art of the Peninsula. The more recent authority of Bourgoin ("Les Éléments de l'Art arabe: Paris, 1879; and his "Arts arabes," previously cited) divides Arab art also into three periods,—the first extending from the commencement of the religion, the Byzantine period, during which the ultimate style was being formed, and closing with the twelfth century; the second extending from that century to the fifteenth, the Arab period proper; and the third extending from the fifteenth century to our day, the modern period, marked by a gradual decline. This subdivision we may accept as that of a profound student of Arab art.

The earliest monuments of Arab art, the art of the caliphs, do not carry us back further than the seventh century, previously to which time the people whom Mahomet called around him do not appear to have possessed,—or research has not revealed to us,—any architecture of their own. Their simple nomadic life was not one calculated to develop such, for of all arts architecture has been justly considered as that best revealing the habits and manners of a people. The first century of Islamism, one hurried series of brilliant conquests in Syria, Persia, Egypt, Western Africa, and Spain, was scarcely a period for artistic creation, and the few buildings erected are imitations of the Greek and Roman works of the Lower Empire. The first work of purely Arab origin of which history makes mention is the mosque built by the Caliph Omar on the site of Solomon's famous temple at Jerusalem (A.D. 637); to the mosque of Omar succeeded the mosque built at Cairo (now "old Cairo") by Amr or Amrou, the brilliant poet conqueror of Egypt (A.D. 644); then comes in order the mosque at Damascus, erected by the builder Caliph Walid in 705; all buildings, however, that in the course of centuries of repair, have preserved but little of their original structures. As for the famous temple at Mecca, the marvels of which all travellers have vaunted, it may be looked on much as Nelson's old flag-ship, the *Victory*, as a modern antique, so completely has it been rebuilt and restored at various times, though the original plans have been religiously respected.

It is unquestionably to Byzantine and Persian influences that the Arabs owe their artistic refinement; their conquering emigration northwards bore back these influences to the heart of the empire. Under Omar, the second caliph, we see entirely predominant,—so De Prangey tells us,—the influence of Persian arts and sciences. These first years of Arab art, the art of the caliphs, like the early commencements of the arts of all people, are, however, wrapped in much obscurity. Debased Byzantine and Persian influences mark deeply their architecture, but these influences, strikingly apparent as they are, we see modified by the exigencies of a new religion, by considerations of time, place, and largely by the important point of the materials which they had the means of "conveying" (in the modern sense of that Shakspearian expression) from the antique buildings. The ogive, or pointed arch, however, by its introduction, adds a fresh mystery to the inquiry, its appearance in the Mosque of Amrou, at Cairo, A.D. 642, being, as Fergusson remarks, "a curious contribution to the much-contested question of the pointed arch."

In its first two or three centuries of existence the art of the caliphs only shows the groping towards its ultimate development, contemporary, interesting to say, with the equally earnest and independent efforts of our own Northern architects to create our exquisite Gothic. No one, however, can fail to regret that the subject of Arab art has not received more study in the mosques of Jerusalem, of Damascus and Cairo, of Kairouan, of Aleppo, of Bagdad, of Persia, and all the countries occupied by the Arab conquerors; it is alone by a comparison of these edifices, combined with an intimate acquaintance with the Christian monuments of the Roman and Byzantine empire, that any definite results can be obtained.

In Sicily we have further traces of the Arabs, left by them during their rule between the tenth and twelfth centuries, a phase of the art of the caliphs of Spain, such as we see it in its more gorgeous development at Seville, at Granada, and Cordova in its famous mosque. Abderaman, amazed at the grandiose monuments of Roman architecture he saw scattered over Spain, endeavoured to emulate in his mosque the Classic marvels among which he lived; urged on by the beauty of the palace which his brother caliph of the East was contemporaneously building at Bagdad, he erected the wonderful mosque which has so long stood as one of the marvels of the art of the caliphs in Spain. His relations with the court of Constantinople, from which he obtained his workmen,—the Cæsar had sent him as a present a number of rare marble columns,—account fully for any strong Byzantine elements to be found in the work. But the Arab style in Spain, and the art of the Moorish caliphs, if it is not the same as that of Egypt and Syria, which it is not, is one that is strongly marked with the influence of its surroundings, and the character of the Moors, a very different people to the Egyptians. The art of the caliphs of Spain, the art of the caliphs of Egypt, and the art of the caliphs of Bagdad are based on the same lines; they bear a strong family resemblance, but, as must always happen in all artistic creations, they are deeply stamped with the influence of the surroundings in the midst of which they were severally developed; each is a study in itself, rich in suggestive beauties; each is differently gorgeous and refined; each has left on the world the mark of its passage, and the creations of each rank among the choicest products of human skill.

* See p. 297, *ante*.

* See Washington Irving's "Conquest of Granada," chap. i.

† See Reinaud's "Description des Monuments musulmans du Cabinet du Duc de Blacas." Pierres gravées. Paris. 1828. 8vo.

‡ See the "Dictionary of Architecture," published by the Architectural Publication Society.

The Education of Artisans.—In the Economic Science and Statistics Section of the British Association's meeting at Southampton, Professor Sylvanus Thompson read a paper on artisan education. He submitted that, apart from the question of the real educational value of science, there remained the fact that the teaching of science, at least in its elementary parts, given in a manner capable of illustration by reference to its application to arts and manufactures, was absolutely necessary for our artisan population. He urged that the provisions of the present education code fall far short of the necessities of the case, and directed particular attention to the introduction of manual instruction into the primary schools, a direction in which considerable progress was being made abroad.

SOME PRACTICAL NOTES ON THE SEASONING OF BUILDING WOODS.

THERE have, perhaps, been as many papers written relative to the seasoning of wood as have been contributed to the discussion of any other purely technical question.

The subject is one to which theorists in particular have devoted a large share of their attention. The matter, indeed, has, for the greater part, been theoretically rather than practically discussed, and whilst an extreme degree of attention has been directed to issues of comparative unimportance, others of material importance have been overlooked. It is hoped by this paper to supply some of the deficiencies which exist.

Commencing upon our inquiries, it is perhaps as well, in the first instance, to inquire what the seasoning of wood really amounts to. It appears to be a prevalent notion that some extraordinary chemical effect upon the juices and saps of wood is brought about by the process of seasoning. Such theories as are, however, held by some scientists possess very little interest to those who make use of wood only as a constructive material.

For practical purposes a given effect is required. Wood is required to be seasoned, and what is mainly wanted to be known upon the subject is, what is the best and most economical method of obtaining the desired result? By what is commonly known as seasoning wood is meant nothing more than drying wood.

Wood is to be dried only by the moisture being evaporated from it. It is an elastic material, and in degree as the moisture exudes so it will shrink. It is also by nature somewhat absorbent, and it will therefore, under certain conditions, attract and retain moisture. For instance, if highly dried wood-work be fixed in a thoroughly damp house, the wood will absorb some moisture, and being of an elastic nature, it will re-expand just in proportion to the amount of moisture it has absorbed. When the house has become dry, the wood will also have dried, and the result of the expansion and afterwards of the contraction will be a number open joints. For these open joints the joiner may receive much censure, although it is highly possible that he may not have been at all in fault. Indeed, if the wood he has used has been highly dried it will, in all probability, have absorbed more moisture than would have been the case if it had only been partially dried, and so when it shrinks again the openings left will in such a case be wider.

Woodwork to be fixed in a newly-erected and, consequently, damp building, should have received a coating of paint before being fixed, as, in such a case, it will not absorb moisture.

These remarks may suggest the inquiry why unpainted woodwork does not continually undergo a process of expansion and contraction. The question is not a difficult one to reply to, although it has not usually been answered in our way.

It is well enough known that wood, in a living state, forms a skin over any exposed portion. Thus, if a branch be lopped off a tree, the injured limb for a time will bleed its sap. Nature, however, supplies its own protection against injury, and a thin skin is soon formed over the injured part, which stays the bleeding. It is the same, to some extent, with dead as with living wood. Flooring-boards, for example, which have been laid down for ten or almost any other number of years, will, if planed over, enter upon a second process of shrinking or expansion, according as they are situated in a dry or humid atmosphere. To season wood, then, is simply to dry it, and that means nothing more than evaporating the moisture from it. For all practical purposes, therefore, we have only to inquire,—

First, what amount of seasoning is required?

Secondly, what is the best way to accomplish the seasoning process?

The issues are, consequently, narrowed very considerably.

When we ask ourselves what amount of seasoning is necessary, we must hold steadily in view the requirements of the different purposes for which wood is employed.

And, first of all, it should be clearly explained that foreign-sawn building woods undergo a limited amount of seasoning before they leave the other side of the water. It would not at all do to store green wood into the unventilated holds of ships, for if such a thing were done, the wood would at once commence to "sweat." In a short time it would become covered with a mildew, and the sap-wood would become permanently discoloured; it would then have depreciated very much in commercial value. To avoid such an occurrence the wood is for a time seasoned abroad under large wooden sheds before being shipped. It is in consequence of being seasoned under sheds that it usually reaches us of such an excellent colour and clean appearance.

The bulk of the foreign building wood imported is used for bearing or joisting purposes. For such purposes it is not necessary that it should be at all seasoned beyond the preliminary seasoning it undergoes previously to shipment. It is a common error to suppose that old wood is in any way better for bearing purposes. A kind of vague idea has generally existed that old wood is necessarily seasoned, and that it is better that it should be seasoned.

In a vague way this view is held to, and yet no one can say in what way *bearing wood* is benefited by being seasoned. As a matter of fact, it is usually more or less *injured* by being old.

At the timber-yards, deals are, as a rule, most indifferently piled. They are not generally in any way protected from the weather, nor are they stored in such a manner as will insure any water which falls upon them running quickly off again. If not piled so that air can circulate through them, and if moisture be present, decay will rapidly supervene.

If the sun's rays be allowed to approach the ends and the sides of deals, a splitting process occurs. Should wet weather then follow, these cracks will become filled with moisture. When frost follows upon wet the splitting process continues, and the deals often become in consequence much shaken. Old deals will have endured these contingencies, and it may be taken for granted that they will not have escaped scatheless. Consequently, it is better on the whole to employ perfectly new wood for all kinds of bearing work.

Wood, however, that is intended to be made up into joinery work must be seasoned; and it is left us to inquire as to the best way of accomplishing the seasoning process.

There are two matters to be considered in relation thereto. First, the wood has to be dried. Secondly, it is not to be injured in the process of drying. The injuries that can be done to the material are those to be caused by the sun, rain, and frost, and by the dirt if it be stored in the immediate neighbourhood of a large town. The only sufficient protection against these influences is a suitable shed for the wood to be placed under. The sides and the ends of the shed must, of course, be open to admit of the wind circulating freely through the deals or boards required to be dried. Thus all that is required is a suitable roof. Such a roof should be exceedingly flat, so as to admit of the convenient piling away of the deals or boards under it. It should be made to well overhang so as to serve in the double capacity of a sun-shade and an umbrella to keep off the sun and the rain. It should also be made capable of being raised or lowered at will, so that it can be placed just over any pile. It should be built in the most exposed part of the builder's premises, for no factor is so important in relation to the seasoning of wood as is the wind. If it blows a gale, so long as it does not upset the piles, it is all the better for the purpose of seasoning.

Deals and boards, when placed for seasoning, should alike be separated at regular intervals by evenly sawn strips of wood. It is better that boards should be seasoned when lying in a horizontal position, because they are then less likely to twist or warp whilst being dried. The long and the short pieces should be piled separately, and in no case should a long deal or board be allowed to overhang without any support, or it will be certain to twist. It is worth while taking care in this respect,—as it is only the more valuable qualities,—those intended to be used for joinery purposes, that are required to be seasoned at all.

Flooring-boards will probably have to be seasoned in the open, because room will not, probably, be found for them under the drying-sheds. If such a thing is possible, then it is all the better, but it is a matter of less importance that flooring-boards should be protected from the weather than any other kind of wood that is required to be dried. When flooring-boards are to be dried in the open, it is better that they should be "perched" on their ends rather than laid out in a horizontal or triangular form. When piled in a triangular form the boards are exceedingly liable to sway at their centres, and thus they will be likely to dry in a twisted form. They also hold at times a considerable amount of water in such a case. It is a good plan, when stacking flooring-boards on a perch, to pile the boards in pairs with their face sides together, as in such case the faces of the boards are kept clean, and thus the necessity of replaning the faces of the boards when laid is rendered unnecessary. As we pointed out in the commencing portion of this paper, seasoned boards will enter upon a second shrinking or expansion process if their newly-formed skins be removed with a planing-iron. There are those persons who are in the habit of drying their flooring-boards before passing them through the planing-machines. This is done so as to have a perfectly clean board when laid, but, for the reasons given, the result is not satisfactory, and further than this, clean faces can be preserved by adopting the practice of stacking the boards in pairs to dry.

For certain processes, such as mould-making, for instance, wood must be highly dried, and in such cases "stoving" may be resorted to with advantage. The main reform, however, required to be effected in respect to the seasoning of building wood appears to be the more general erection of suitable and sufficient drying-sheds, having open sides and flat movable roofs. Doubtless the erection of such sheds necessitates the expenditure of a considerable amount of money, but it is as well to bear in mind the admitted adage, that what is worth doing at all is worthy of being done well. There can be no doubt but that most consumers of wood suffer heavily through losses incurred in consequence of the depreciation of stock which has not been sufficiently well cared for. A well-designed and suitably situated drying-shed will permit of the wood which is stored under it being perfectly seasoned, and yet kept free from grit and dust, whilst the havoc which the sun, the rain, and the frost usually commit upon wood that is undergoing the process of being dried will be altogether avoided.

It should be well borne in mind that wood often suffers very much in consequence of its having been stored away in the sale timber-yards without any sort of protection, and it is to be hoped that ere long some protective provisions, in the shape of sheds, will be brought into general requisition by the timber merchants. Until such protective provisions do become generally established we would strenuously advise builders to buy, when possible, newly-arrived stock, and to take care themselves of that portion which they intend to devote to joinery or other similar purposes.

THE GENIUS OF SIR CHRISTOPHER WREN.

A GREAT deal of misconception prevails, I apprehend, as to the character of Wren's genius.

By the word "genius" I mean a compound of two principal faculties of the mind in their highest perfection: reason and imagination, accompanied by emotion. To these two faculties in combination, the godlike reason, as Shakspeare calls it, and imagination, all the greatest discoveries and enterprises of the world, as well as the great literary and artistic creations, are due. According, however, as one or other of them predominates, genius becomes either scientific or artistic,—the interpreter of nature, or the creator of the beautiful.

As I remarked in a former paper, entitled "Sir John Vanbrugh and his Critics," Wren's career was in the main the very opposite to that of Vanbrugh. While the latter, who was previously a dramatist and poet, was attracted to architecture by its poetic side, Wren, who was one of the greatest geometers of his time, and whose precocious mind had displayed itself not in poetic fancy and fire, but in the abstruser paths of philosophy, was drawn, by the unusual events of his day, towards its scientific side. Their minds had dwelt in two different worlds: Vanbrugh's amid fair ideal forms,—

> "Which craft of delicate spirits hath composed
> From earth's materials,"

or contemplating the touching scenes and events of human life; Wren's in that independent world, as Wordsworth has it, created out of pure intelligence, the world of the mathematics; and his ideal of architectural beauty and grandeur was derived chiefly from that

inner realm of precise and regular geometrical forms, and infinity of beautiful curves. Neither of them came into the profession by the door, —I mean, from the feet of a professor. The key to Wren's architectural character, his constructive and scientific pre-eminence, will be found in his mathematical endowments and training. His strength lay in his geometry, which was his divining rod; and his works are examples of its power in architecture. They suggest that to be a geometer is to be almost an architect, or quite an architectural constructor; and that, like astronomy, building and engineering might be termed mixed mathematics.

It was probably chiefly owing to his general reputation for scientific skill that he was appointed by Charles II., in 1661, assistant to Sir John Denham, the surveyor-general; which was his first introduction to architecture.

What imagination he had received from nature would, of course, be none the worse for his mathematical training. As the imagination must be useful in geometry, which, as D'Alembert remarks, of all the sciences belonging to reason is the one wherein imagination has the greatest share,—in which I may add, thought can scarce move but on its wings; so geometry, which, from a few simple axioms and self-evident principles, leads the mind to the most general propositions and remote analogies, must be a discipline to the imagination as well as to the reasoning powers, strengthening and expanding it for the reception of vast and sublime ideas.

Whether this was the case with Wren or not, geometry dominated and regulated his ideas of beauty both in planning and profiling, and continued to inspire him throughout his career. It manifested itself in his magnificent plan for rebuilding the city after the Great Fire, in his numerous churches, and in both his designs for St. Paul's. It was by geometry and common sense, it would seem, that he solved the problem of adapting his ecclesiastical buildings to the form of worship of the Established Church, for which no precedent existed; maintaining the most characteristic feature of the Church of England, the steeple or spire and lantern, in a style never before applied to it, translating, if I may so term it, the Gothic steeple into Italian.

His churches, which are most of them the perfection of ingenious planning, are geometrical studies, as well as places of worship! St. Stephen's Church, in Walbrook, justly celebrated through Europe as one of the most beautiful pieces of planning ever produced, and a masterpiece of interior composition, draws all its charms from geometry. It is a gem that sparkles among architectural productions like some of the happiest minor efforts of the muse among poems, and leaves nothing to be regretted save that the same principle of composition had not been applied to the exterior, where a like combination of geometrical solids would have been equally satisfactory.

It was through his geometrical propensities, doubtless, that he became enamoured of the peculiar central feature of the plan of Ely Cathedral, and adopted it as the nucleus of his design for St. Paul's, which is no exception to the geometric composition and character of his works. Its appropriation of the octangular centre of Ely renders St. Paul's something more than a development out of St. Peter's, to which, indeed, Wren owed but little, and to which St. Paul's is in some important respects superior. He had as much right as Michelangelo to elevate the Pantheon or temple of Minerva Medicæ on the Temple of Peace; and combine the grandeurs of the basilica and circular temple. After seeing Perrault's colonnade of the Louvre on his visit to France, Wren's geometrical resources, his familiarity with cylinders, cones, and spheres would soon impregnate his mind with the grand form of St. Paul's. But his predilection for geometrical regularity and precision leads him, ashamed of the picturesque clearstory, to disguise it by the false upper façade; and by the circular apse and transept porticos to still farther diminish the simplicity called for by the domed rotunda above.

Again, his fondness for circular forms and skill in arching, leads him to arch all the windows, though square heads would have been more expressive of power, and more in harmony with trabeation. Arches without and niches within, and pendentive domes covering both nave and aisles throughout,—circular or circular-ended chapels and vestibules, octangular vestries, elliptical and geometrical staircases, and niched windows, all breathe of the geometer, as do also the domes of contrary flexure of the west towers, and the consoles or trusses to the upper entablature surrounding the building. As, to a geometer, an isolated Corinthian column must be a fascinating object, for its susceptibility of receiving subtile lines in its entasis, &c., as well as for its capital, which is a singular instance of beautiful natural forms attuned to the music of geometry in the abacus and volutes, isolated columns play an important part in St. Paul's, in the west front and surrounding the dome, which two features, caught in a certain relative connexion, present one of the finest architectural scenes in existence, and have the advantage of St. Peter's in being seen along with the flanks,—the flanks in the latter being hidden by Bernini's colonnade, which had better have *surrounded* the church, like the ancient peribolus, or sacred court.

The same principle pervades and governs his first design for St. Paul's, which is singularly geometric in its aspect, both within and without, and seems a product of fancy's loom rather than imagination's, — gravity and solemnity therein being sacrificed to geometrical grace.

It is true that all architecture draws more or less on geometric forms, and that there are other buildings besides Wren's, some of the greatest in the world, which are strikingly geometrical in their composition. The Church of St. Sophia, at Constantinople, which was the model of the Byzantine churches and Turkish mosques, of which the dome and pendentive dome are the chief characteristic, would seem to have had but little other inspiration. But there is no instance, I believe, of this source of inspiration being so clearly manifest throughout the works of one man as in Wren's, which stand out distinctly from all others in the same style, and show themselves diametrically opposite to the wild naturalness of the Gothic, with which he had little or no sympathy.

Such, I think, is the characteristic of the genius of Sir Christoper Wren, which is not more remarkable than it is admirable in itself. His thus sublimating and utilising his mathematical learning and resources reminds me of Milton's use of his historic and literary lore in his divine poem; and proves that he was not without the vital faculty of assimilation,—the power that turns to its purposes whatever material is submitted to it.

This characteristic trait is valuable inasmuch as it contributes to his originality, which is a chief merit of Wren, who throughout his career exhibits an unfolding of himself, and no yielding up of his own peculiar personality to form himself on the model of another. As evinced by his letters from France, he was anxious to enrich his mind and increase his materials by seeing as much as possible of the best work in the style he was pursuing; but, instinctively discerning the true nature of architecture, and proper use of its examples, he poured ancient and modern thought into new moulds, and evermore held an original and philosophical relation to architecture.

In the general conception of St. Paul's he emulated and sought to excel St. Peter's, as well as to embody a broader and more philosophical idea than the Western Mediævalists had dreamed of. His choosing the dome, the sublimest of all forms by which space can be covered, as its crowning feature, and surrounding it with the unbroken Corinthian peristyle, the grandest accompaniment it could receive, shows, I think, that he was aiming, as Michelangelo was before him, not to breathe into stone any special or definite expression by which the whole is made to sympathise with man's devotional feelings, and becomes a petrified liturgy, if I may so picture it, but, however vainly, at an ideal, abstract temple, worthy, by its intrinsic beauty and sublimity, to be a dwelling-place for the Most High, which was something like a return to the governing idea of Solomon's Temple at Jerusalem.

Such, probably, was the aim, in this his greatest work, of Sir Christopher Wren, who was a true architect, as well as a renowned mathematician and astronomer, and truly great man.

Nevertheless, his acknowledged failure in the designs of most of his numerous steeples, though they are said to be based on principles laid down in his writings, may justify a doubt whether he had the strength of imagination or poetic fancy and feeling to conceive graceful architectural forms independently of his geometrical resources; especially if we consider that the occasion was sufficient to awaken any faculty that had during his scientific days lain dormant in his mind.

With no vain wish to dim the halo that surrounds, and will for ever surround, the name of Sir Christopher Wren, I confess that I have long been under the impression, induced chiefly by the outlines of his steeples, that his artistic faculties were by no means commensurate with his scientific, which his inventions and discoveries at a very early age, and the frequent association of his name as mathematician with those of Wallis and Newton, would suggest were of the greatest; and that he had not the fire and imagination necessary to constitute an architectural genius of the highest order. There is nothing to weaken that impression in his greatest work, which, though all that I have pronounced it, is, nevertheless, remarkable for nothing so much as its deficiency,—its stopping short of its greatest attribute,—which has caused so much discussion of late years as to its proper decoration, and renders it more than probable that Wren never had a full conception of his great work in his mind,—in all its due and appropriate finish and ornaments, sculptural and pictorial. What was the chief glory of St. Sophia's, St. Mark's, the Alhambra, and most celebrated edifices,—that which, composed of the highest forms of living beauty, gives additional life, and the full expression or speech to a building, whose design offers the greatest opportunity for exercise of imagination and delicate feeling, while it requires a greater knowledge of effect than aught else,—is, for the most part, wanting in St. Paul's. That important element, in short, the possession of which gives to architecture its high place among the arts of design, *with* which it is the highest of them, and *without* which it is the lowest.

Neither this nor any other shortcoming in Wren, it should be remembered, could arise from want of opportunity; for no architect that ever lived had so great opportunities of displaying what gifts, natural or acquired, he possessed. He had not to break "poverty's unconquerable bar," nor any other bar that we hear of; nor to scramble, like later artists, in the mire of competitions; but during the fifty or more years of his devotion to architecture, uninterrupted by affliction or other casualty, he had commissions for all kinds of public and important buildings thrust on him; and if any wandering muse or spirit of art may be drawn to our service by the enchantments of knowledge, he had it.

My chief aim in these remarks is to enunciate what I deem an important truth, viz., that Wren was not of the highest order of architects, his works not being the perfection of architecture, as is generally, if not universally, supposed by the followers and advocates of the Classic schools,—a truth which, if accepted, cannot but tend to good by removing a false standard of excellence. It is,—

> "Only as admiration, hope, and love
> Are well and wisely fix'd,
> In dignity of being we ascend."

SAMUEL HUGGINS.

P.S.—The above was written before I was aware, through the *Builder's* review (Aug. 26) of Mr. R. G. White's book "England Without and Within," of his attack on the works of Wren. To the just remarks thereon, in that review, I would beg to add, though with strong doubts as to its title to further notice, that it is virtually a condemnation of some of the oldest and most ambitious structures of the critic's own country, as the Capitol at Washington, the State House at Boston, &c., which are domed compositions emulating the grandeur of the metropolitan church of the mother country; while most of the older Classic churches are echoes of Wren's or his pupils'. These and other American structures may, indeed, be deemed, in some sort, like the people, English emigrants, at least, descendants of English buildings, chiefly Wren's, which are repeated in a numerous progeny in the older States. For this reason, an Anglo-American attack on Wren's architecture is almost as great a blunder as would be an assault upon the Anglo-Saxon race.

It is absurd, however, irrespective of such consideration: if St. Paul's is ugly, Nature herself, in her grandest phases, is ugly; and if its round windows are ridiculous, then the canopy of heaven, the round earth, and the round human skull, are ridiculous; and the inventions of the arch and dome are mistakes.

S. H.

THE PROPOSED CRYSTAL PALACE FOR PARIS.

ACCORDING to the Continental press, the above enterprise is of a comprehensive nature, including permanent exhibitions of collections of various kinds, galleries of painting and sculpture, rooms for gymnastic exercises and scientific experiments, concert-halls, &c. In this international museum of industrial art it is intended to exhibit all new inventions of an interesting character which may have been brought into public notice in other countries, while the concourse of foreign visitors will, it is supposed, be of value to French industry in making its productions more extensively known to the world at large.

The internal arrangements will comprise various groups of subjects, such as the progress of science in general, the productions of art and literature, experimental science, education, the development of the industrial resources of France, &c. The front of the building will look towards Paris, and its situation between the park of St. Cloud and the railway from Paris to Versailles will render it of moderately easy access. The structure will cover an area of about 17½ acres. The dimensions of the main building are approximately as follows:—Length, 1,640 ft.; height, 165 ft.; width, 460 ft. Amongst the remaining features of the scheme are panoramas on an imposing scale, a large amphitheatre for athletic sports, a model farm, and ornamental buildings of various kinds. It is proposed to erect in the grounds, and thereby preserve to posterity, such monuments of architecture as it may be found necessary to remove from their present sites in any part of France.

THE BRITISH ASSOCIATION ON THE DRAUGHT OF CHIMNEYS.

A FORMULA AND TABLE FOR CHIMNEY DRAUGHT.

THE attention of the Mathematical and Physical Section of the British Association was, on the 30th of August, called by their president, Lord Rayleigh, to the very humble practical inquiry as to the effect of wind on the draught of chimneys. It would be difficult more aptly to illustrate the true connexion between the pursuit of pure science, and the most everyday annoyances of domestic life (with a view to the removal of the latter), than is afforded by this announcement. As a prime feature in the architecture of dwelling-houses the chimney demands a chapter to itself. And it is well that the basis of this chapter should be mathematical. With regard to draught, we have more than once had occasion to remark that it is a function of the height of the chimney-tubes. We do not, of course, apply the remark without modification to the details of ill-constructed chimneys. Many chimneys smoke from positive ill-construction, having a narrow part, an ugly bend, or a downward portion, in their conduit, which the normal draught is not strong enough to overcome. Others smoke because they form the shortest channel by which air can enter the house to supply the draught of the loftier chimneys. Where there are two chimneys in one room, and the doors and windows are closed, lighting a fire in one chimney will ordinarily cause down-draught in the other, as the readiest mode of maintaining the atmospheric equilibrium. In most cases, however, the addition of a yard or so to the height of the chimney-stack, supposing that to be already above the highest part of the interior of the house which it ventilates, will prove more useful than the addition of any of those curiously contorted and wholly non-pneumatic contrivances, the endless variety of which tortures the eye of the mechanically-minded man as he whirls along the suburban railways.

Apart from the questions of normal draught, and of internal regularity of construction, is the effect of wind on the draught of chimneys. This varies very much with the locality of the house. It may be said to be primarily a question of site. Neither is it a question always to be settled, *à priori*, by the architect. The action of wind, although, of course, always determined by physical laws, is so subtle, and so delicately affected by slight causes, that there are cases in which it is all but impossible to foretell it. What is more common than to have a chimney that answers perfectly well, except when the wind is in one particular point of the compass? And why does it then smoke? To be able to reply to this question is to be able to cure the defect; but how often is the difficulty regarded as insuperable? It may be useful to cite an instance of the deflection of wind in a manner that it is difficult to explain, and that could certainly never have been anticipated. On the lovely plain of Sorrento, sloping towards the Bay of Naples, in the midst of its own gardens and orange groves, stands a stately palace, which, in the days when the name of Nelson was a terror on the seas, was a favourite haunt of the Queen of Naples, and was not unfamiliar to our great sea captain. There are no rocks, lofty buildings, or overhanging trees in the immediate vicinity, and nothing that is apparently likely to interfere with the free movement of the wind, from whatever quarter it may blow. The aspect of the front of the palace is northerly, looking over the Bay towards Naples, and the hills behind it. On a few occasions,—some three or four times, perhaps, in the year,—a strong east wind sweeps across the peninsula, and is clearly indicated as to its course by the straight and level stream of smoke that it drives from the cone of Vesuvius across the Bay. But on these occasions, the current is so deflected by the northern shores of the Bay, fully twenty miles distant, as to drive on the front of the palace; that is to say, in a direction pointing nearly due north, with such force that it becomes necessary to close the *persiani*, or outer window-shutters, in order to preserve the great drawing-room windows from being blown bodily in. Full familiarity with the spot does not afford any very satisfactory explanation of the phenomenon, of which, however, we can speak from repeated personal observation.

This, perhaps, may be regarded as an extreme case. Nevertheless, it is typical of not a few instances in which currents may be detected after a house is built, the existence and effect of which the architect cannot be blamed for not having foreseen, but the influence of which on the draught of his chimneys will be, for so many days in the year, at once irresistible and intolerable. There is now absolutely nothing for it, in such a case, but to put out the fires. We do not say that a cowl may not be of use, but, on the other hand, we cannot speak from any experience of the action of a cowl under such conditions.

Here, then, comes in the scientific part of the question as attacked by Lord Rayleigh. What is the effect of a cross current of wind on the draught of a chimney? As the direction of the wind is more and more downward, his lordship replies, the up-draught of the chimney diminishes, but does not turn backwards, that is to say, become down-draught, until the inclination amounts to about 30°. This is an important point at which to arrive. It is, however, obviously necessary to ascertain the precise features of the cases where the experiments were made, before formulating any absolute rule on the subject. The height of the top of the chimney, both above the sea level and above the basement of the house, is one fact needful to determine. The force of the wind is another. Thus, a wind of the velocity of ten or twenty miles an hour blowing downwards at a measured angle would produce a very different effect on the draught of a chimney 40 ft. high from that which it would have on the draught of a chimney 100 ft. high. If our recently published table on wind pressure (*ante*, p. 200) be referred to, it will be seen how important are these data for the solution of the problem.

Again, the maximum up-draught, we are told, is not with a direction of wind vertically upward, but with one making an angle of about 30° with the vertical. This is a result which it is without our experience either to confirm or to question. But it is clear that the cases must be extremely rare, if ever they occur, in which the top of a chimney would be exposed to a wind blowing upwards at a more acute angle than 30°. The determination of the same angle as the limit of downward and of upward efficiency is as elegant as it is unexpected.

A yet more practical part of the subject is the remark of Lord Rayleigh, that "a chimney with a T-piece at the top never produced an unfavourable effect on the up-draught, and only in one case failed to produce a favourable one." Professor de Chaumont thought vertical ends would increase resistance to the up-draught. So do ninety-nine people out of a hundred. We have no hesitation in saying that Lord Rayleigh is right, and that general opinion is wrong, provided, that is to say, that the protection of the chimney-top be rightly designed. And we say this absolutely and unhesitatingly, because our judgment is based on the two independent and concurrent sources of evidence afforded by observation and by direct experiment. In Southern Italy chimneys, no doubt, are comparatively few, but they exist in many buildings, and no Italian architect would dream of leaving a vertical flue or pipe open at the top to receive the tremendous downpour of rain which occasionally occurs in Italy with almost tropical violence. The aperture of the chimney is always roofed over, the smoke escaping by side apertures. The practice of the master-builders of the world is thus in accordance with the theory of the English scientific noble in this respect.

Experience, we have said, confirms the remark. And here, if we seem for a moment to depart from an admirable rule,—that of not mentioning in a scientific paper anything that may look like an advertisement,—we must explain that such appearance is deceptive. We have to refer to an admirable invention, which was made and sold some forty years ago under the name of Day's Patent Wind Guard. As to the validity of the patent it is not needful now to inquire, as in any case it must have long since expired. But what we lament is, that, so far as we can discover, this admirable invention has been entirely forgotten. In recent inquiries which we have instituted in order to obtain one of these wind-guards for our own use, we have been unable to discover that they are now made, although figured in some old trade-books. It may, therefore, be of much use to give such particulars as will guide any one in constructing an appliance of the kind.

Let us take, for example, the case of a chimney two bricks and a half, or 22½ in., square, with a flue of 9 in. square. A frame is to be constructed which would lie upon this hollow square, and allow bricks to be built on it to the height requisite to hold it steady. From this frame the guard itself rises as an octagonal shaft. Four pieces of sheet iron, or of slate, each 9 in. wide and 18 in. high, are fixed on the lower frame, 16 in. apart, so as to form four sides of an octagon, and the other four sides are formed of four similar plates, set at angles of 45° with the former, but so much within them as to allow 1½ in. to 2 in. clearance between the edges. These inner plates will just touch the outer angle of the 9 in. flue. A top, of iron or of stone, holds the upright plates together, and both top-plate and base-plate may be finished with a simple moulding. Sheet iron is perhaps the best material, but it is obvious that the contrivance may be made also in slate.

As to the perfect security which this guard effects from wind, we can speak not only from the testimony of those who have used the plan, but from careful experiment. With models of the wind-guard, made on the scale of 1 in. to a foot, set on small tubes of proportionate size, representing chimneys, which were fed with smoke from the combustion of paper, we have experimented by means of powerful jets of wind driven in various lines of force; vertically downwards on the top of the guard, horizontally at right angles to either side or angle, or in any other direction. In no case have we found it possible to produce down-draught in the chimney by the force of wind. On the contrary, the greater the force the better the draught of the chimney.

The *rationale* of this action may be illustrated by that of a much later invention, now in common use on our railways,—the steam injector. Let those of our readers who desire to master the subject, and have no more ready mode of doing so, refer to the diagram and description of this appliance which is given by Sir F. J. Bramwell, on p. 335 of a work recently published by Messrs. Longmans, under the title, "Railways and Locomotives." It will there be seen that "steam, escaping at high velocity through a circular orifice, induces a current in a body of water in connexion with that orifice, and carries it forward, at the less velocity corresponding to the increased weights of the combined stream of water and steam, but still at a high velocity." This stream passes into an expanding channel, where its velocity is further reduced, and so into the boiler, which is thus fed with water.

In the case of the wind-guard, the wind striking on the outer plate causes a current of proportional velocity between the edges of the outer and inner plates, and thus creates an

induced current, which comes in aid of the draught of the chimney. The difficulty to be overcome is far less than in the case of the two fluids of unequal specific gravity. But the effect is so much the more powerful. We are familiar with the contrivance mentioned by Professor de Chaumont, which has been used for the protection of lamps from the dash and spray of the sea, as we believe, with admirable results. But it is a much more complicated, and therefore more costly, contrivance than the very simple one which we have endeavoured to rescue from oblivion. And we think that it is purely protective in its action, while the construction that we describe is not only protective, but absolutely aids the up-draught; and, moreover, the cone is more likely to become choked with soot. The brush of the sweep can easily ascend into the interior of the wind-guard, in case of any soot lodging there.

We have little doubt that any enterprising manufacturer who will discover one of these old wind-guards (they were made and sold somewhere in Pimlico, in 1842), make some to pattern, and introduce them to the trade, will at the same time do a good stroke of business, and confer a very great benefit, both on the architect who has to build in exposed and gusty situations, and on many a householder who now knows too well, and that to his cost, when the wind is in the east,—or in that quarter, wherever it may be, that is hostile to the good behaviour of one or more of his chimneys.

We are not acquainted with any mathematical formulæ intended for the guidance of the architect as to the height or draught of chimneys. It may, therefore, be of some service to provide a simple table for the use of the architect and of the builder, stating, in the first instance, the principles on which it is calculated.

The only cause of that upward movement which we call the draught of a chimney is the difference between the weight of the column of air and vapour in the shaft, and that of a column of equal height of the exterior atmosphere. This difference of weight must be enough to overcome the friction within the chimney-shaft and any resistance to free discharge at the top. It is obvious that the ascending volume consists of matter which, at equal temperatures, is heavier than atmospheric air, as it contains soot, or finely comminuted carbon, carbonic acid, sulphur, and other matters naturally heavier than air. Calling attention to the existence of these two sources of retardation, viz., friction and the loading of the column, it will be safe to neglect them in tabulation, as it is very difficult to determine the absolute heat of the ascending column, and a few degrees more or less will amount to quite as much as the elements thus neglected. With this explanation, the formula that regulates draught may be thus stated:—

$$D = (a.t. - a.t'.)\ h.$$

where D = the draught, $a.t.$ the weight of a cubic foot of atmospheric air at the external temperature, and $a.t'.$ the weight of a cubic foot of atmospheric air at the mean temperature within the shaft, and h the height of the chimney. It is obvious from a glance at this formula of how much importance the addition of a very few feet to the height of a chimney must be.

To increase the draught, we must increase either h, the height of the chimney, or t', the temperature of its contents. This explains at once the efficacy of the best appliances for increasing draught,—such as the bi-valvular registers, in this country, and the iron blind that is drawn down within the chimney aperture in the wood-burning fireplaces of France and of Belgium. The larger the aperture below,—the greater the quantity of cool air that enters the chimney,—the lower is t', and the less the draught. The more the air that enters below is compelled to pass through in close proximity with the burning fuel, the higher does t' become, and the more powerful the draught. This is the simple key to the whole theory and practice of draught produced by heat. Of course, in different conditions of the barometric column equal amounts of heat will have somewhat different effects. Hence we can see in a moment why our fires should "draw" so much better in clear cold weather than when the air is warm, or loaded with damp. The weight of a cubic foot of air at 32° Fahr. is 0·080728 lb. avoirdupois.

If the top of a chimney-flue were closed by a flap, or hinged valve (the weight of which we take as counterbalanced), the effect of the draught, or rather of the downward pressure of the external atmosphere which causes the upward draught, would be to lift the valve in proportion to the force of the current. If at the same time a strong wind be blowing over the top of the chimney (in the direction of the hinged end of the flap), its effect would be to force down and close the valve. The stronger current of the two will obtain the mastery, to the degree of its excess of pressure. This is also the effect, it will be seen, of cross current where there is no valve, but where the two currents more or less interfere with the movement of one another in the way shown by the action of the valve.

It is possible wholly to eliminate the ill effects of this cross current, and even to utilise it in aid of draught, by any contrivance that causes the external blast to produce an induced current from within the chimney; and this, it is easy to see, is the effect of the wind-guard.

In calculating the following table we purposely use round and approximate figures, as quite sufficiently accurate for practical purposes, and as more readily intelligible to many readers than more complicated mathematical expressions. We have also used the pressures proportionate to velocity as allowed by Smeaton, and given in Table I. of our recent article on "Resistance needed to the Pressure of the Wind" (p. 200, *ante*). Now, assuming, for convenience of calculation, an increase of temperature of 108° Fahrenheit (that is, from 62° to 170°), as imparted by a fire to the ascending column of air that passes over it up the chimney, we shall have an upward pressure of a fraction over 0·04 lb. for every foot of ascent in the shaft. This is represented in the following table of comparative heights of chimney, pressures, and velocities of current, calculated for that rise of temperature.

Table for Calculation of Chimney Draught.

Height of Chimney in feet.	Pressure due to 116° Fah. in pounds per foot.	Velocity of draught in miles per hour.
30	1·2	16
40	1·6	18
50	2·0	20
60	2·4	22
78	2·8	24
80	3.2	26

It will be proper, in making use of this table, to refer to the table (III.) given in the article previously quoted (*ante*, p. 201), showing the increase of velocity of the wind with the height obtained above the ground. Thus, in rising from 15 ft. to 50 ft. there is, as shown on that table, an increase in the local velocity of the same wind from 60 to 70·8 miles per hour. In raising a chimney from 15 ft. to 50 ft. we should obtain an increase of draught pressure of from 0·6 lb. to 2·0 lb. per foot, as against an increase of wind pressure, in a great storm, of from 20 lb. to 27 lb. per foot. The gain is more than threefold,—the loss less than 33 per cent. We mention this, not as a difficulty, but to show that proper consideration must be given to the whole subject.

It is, of course, apparent that if we have an ordinary fireplace, with a chimney 50 ft. high, and with that proportion of fuel and of draught which gives a current of twenty miles an hour to the ascending column of smoke, the aperture at the top of the chimney would be closed by a cross-current blowing at the rate of seventy miles an hour, almost as efficiently as by a valve weighted to 27 lb. per foot. The fire, in fact, would have to be extinguished. But the pressure of 27 lb. per foot, or 0·19 lb. per inch, is very trifling in comparison to the pressure of steam in a boiler; and as the action of the injector by induced current is an ascertained fact, it is plain that it is within the province of the engineer to make the hurricane, blow it ever so wildly, produce an induced current through a chimney, so that the draught shall in no way be reversed by storms. As to, that there can be no doubt, although this may be the first time that the statement has been definitely made. We have given what our own experience has led us to believe to be a simple and effective means of producing this induced current. If any of our readers can recommend a better plan we shall be happy to make it known.

We had put on paper some remarks on one or two other matters discussed at the British Association which appeared to us of striking industrial importance; but the novelty of a scientific investigation of a subject which most men are accustomed to regard with a hopeless shrug of the shoulder, as well as the importance of a thorough appreciation of a matter which comes so directly home to every householder and to every house-builder, is such that we have thought it well to devote to this question of draught all the space at present available. We think it cannot be too strongly insisted on that when, first, the subject of up-draught, and, secondly, that of wind-protection,—or rather wind-induced draught,—are seen to be thoroughly within the control of science, it will be felt to be unpardonable to be condemned to the great nuisance of a smoky chimney.

CONTINENTAL GATHERINGS.

THIS is the season of the year when archæology is the order of the day. Archæological societies are meeting in every corner of the country, and many a quaint district has been invaded by eager excursionists. In the annual obligatory *villeggiatura* of every family that respects itself an interest in antiquarianism forms a necessary feature; old churches, castles in ruins, and ivy-covered monastic buildings are pried into, sketched, and visited, guide-book in hand, and the mysteries of architectural styles become positively familiar,—during a few weeks,—to the more enthusiastic. This eager interest in archæology, expressed annually during the autumn, the various papers read by kind members, and the learned explanations of local *ciceroni* do not, fortunately, however, represent the sum of the labours of the profession. Its members work in most cases laboriously and modestly, amply rewarded by the humblest find. It is not all of them who have such a field for research as the director of the excavations at Pompeii, who, we hear, has been recently adding fresh stores of information to our knowledge of the buried city. A house has been laid bare in the ninth quarter,—so we learn from the *Zeitschrift für bildende Kunst*,—which, from the nature of the objects discovered, the beauty of the wall paintings and the fountain, must clearly have belonged to some wealthy patrician. Unfortunately, it would appear that the researches in this direction are threatened to be entirely stopped by the presence of a modern villa,—the Villa dell' Aquila,—built on the ground which has covered up the classic city. When, a year since, the state of the works was reported in these columns, the villa already promised some difficulties, which, it would seem, have not by any means been arranged. In the mean time the excavations have been resumed in another direction, towards the village of Torre dell' Annunziata, in what is known as the eighth quarter. Here, though the yield of antiquities has been but meagre, some most interesting facts have been brought to light; the neighbourhood was evidently one occupied by the poorer section of the Pompeian population. The houses are small, and in their architecture betray two different styles; from this fact it has been surmised that this portion of the city must have suffered during the first great eruption of 63 A.D., and then was rebuilt only to be totally buried in the final catastrophe of 79 A.D. One most interesting discovery has been made of a baker's shop with a large oven,—not a novel feature, it is true, as others have been found in Pompeii, but in the little room behind the shop were discovered the skeletons of two little children, the first that have been found in Pompeii; unfortunately no cast could be taken of the fragments, which crumbled to dust immediately on their contact with the air. A second shop was discovered in the neighbourhood, filled with a large number of beautiful works in terra cotta of Pompeian manufacture. The considerable number of objects in terra cotta found leads to the conjecture that it is a potter's shop that has been laid bare, as most of the objects are of the same form and colour, though of different sizes. But at the potter's the find of the most importance was that of a basket containing coal. Till now it has been held that the Romans alone knew wood as a combustible. The discovery is most curious, and, when made more generally known, is likely to arouse no small amount of interest. In this same quarter a street has also been laid bare, and under the 12 ft. to 15 ft. of ashes have been brought to light the corpses of a woman clutching tightly the hand of a little

ten-year-old child. From the emaciated appearance of the boy it is presumed that he may have been ill in bed at the moment of the sad destruction of the city, and the woman by his side had induced the poor little sufferer to endeavour to escape. An attempt made to obtain a cast of the woman proved hopeless, but her jewellery, two gold armlets and two gold rings, one of emerald the other of amethyst, beautifully engraved, have been saved. A cast of the body of the child, though wanting the right hand and left leg, has been successfully taken, and now forms an interesting addition to the curious little museum attached to the excavations; all the more valuable discoveries made at Pompeii going, it will be remembered, to the superb Museo Borbonico at Naples.

Johnson it was, if we mistake not, who, a century ago, remarked that there were very few subjects which could not be found treated by some French writer. True in his day, it is even more so now. Certainly the recently-published translation from the Chinese of a native work on the history and preparation of China, or, as we term it, Indian ink, may be said to supply a fund of information respecting a subject interesting to the architectural profession, about which it would be difficult to find much that has been written. M. Jametel, the translator, knows China well, and having lighted upon a Chinese manual descriptive of the manifold virtues of that indispensable element of architectural production, Indian ink, has considered the little work interesting enough to set into a language which, as Bacon has it, might be more "understanded" of the general public than in the original. The secrets of the wonderful industries of China, laden as they are with traditions of secular antiquity, are not easily fathomed by the European barbarian, so that there is a strong element of novelty about the information we are thus enabled to obtain. The art of writing is traced back by the Chinese to almost fabulous antiquity, the invention of ink being claimed by Tien-Tchen, who lived under the rule of Honang-Ti, 2697 to 2597 B.C. The ink at first was a sort of lacquer, then a black stone ground with water was used to write with, and it was only in the third century before the Christian era, under the dynasty of the Ouei, that, in the province of Kiang-Si, balls were made composed of lamp-black, obtained by the burning of a mixture of lacquer and pine-wood, and glue made either of fish-bones, the horns of oxen, deer, or rhinoceros. It is possible that this process was introduced into China by the Coreans, whose influence on the civilisation of the extreme East modern research has of late revealed. Be this as it may, it was under the dynasty of the Tang, seventh and tenth centuries of our era, that the manufacture of China ink obtained its highest perfection. The name of the great maker of that time, Li-ting-Konei, has been reverently handed down; his products were of such perfection that to this day they have never been equalled. It is not, however, from want of minute precautions that there exist deficiencies, as may be seen by M. Jametel's manual; indeed, it is interesting to read of the extraordinary care, the attention to details, the almost religious formation of Chinese industry. In the country of mandarins and of an antique literature, ink, as may be imagined, plays a considerable part; the Chinese, indeed, regard it as a protecting genius who is subdivided into as many little spirits as there are sticks of ink in the world. M. Jametel cites a work in which we are told that the Chinese conferred in antiquity on ink the title of prefect of black perfume, and that in this position it was to have precedence of the brush, which only ranked as sub-prefect, and over paper, which occupied only the inferior post of head of a district.

It is, perhaps, the character of Oriental art, but it must be admitted by all, even its admirers, that we hardly look upon its creations in that same personal light that it is impossible to avoid in judging of European art. We regard it, as it were, as the spontaneous outcome of a state of existence in which we are disposed to say that everything is beautiful and tasteful, but the East, like the West, has its artists, who have succeeded in attaining an individuality, and whose names are treasured among the worthies of the country. It is a little curious that it has been undoubtedly the Europeans who first brought to the minds of the Japanese the peculiar merit of their national artist, Hokusai. Our Parisian contemporary, the *Gazette des Beaux-Arts*, in a recent issue, has given a most interesting sketch of the life and works of this great artist, the fertility of whose genius is positively astounding. The name Hokusai is, it would appear, a *nom de guerre*, just as with us we speak of "Phiz,"—poor "Phiz," now no more,—or as the French would speak of "Cham" and "Gavarni." During the course of his long life,—Hokusai was born in 1760 and died only in 1849, at the advanced age of eighty-nine,—the artist appears to have changed his name and signature more than once, a fact which has somewhat baffled his biographers in their researches. England and America may claim perhaps to have been the first to bring before the notice of the Western world the peculiar power of Hokusai's genius. Mr. Dickins, in his "Fujaka Hyakukei," or hundred views of Fuji, a work published in London two years since, gave a most interesting sketch of the life and works of this typical Japanese artist, who at the beginning of this century founded the existing modern school of Japanese art. To Dr. Anderson's writings, again, those anxious to learn more may be referred; as also to a recent article, written by Mr. Edward Morse, in the American *Art Review*. At a moment when we hear that the authorities in Japan have closed the art-schools when they discovered that the pupils were merely preparing to send their works to the annual Paris *Salon*, it is, indeed, refreshing to have brought before one the products of so characteristic an artist as Hokusai. All the quaintest inventions of the weird Japanese mythology he has pictured in the style that has endeared the art of Japan to so many. It was quite late in life, it would appear, that Hokusai came out. His first volume of rapid sketches, "Mangona," was only published in 1810; between that date and 1840 no less than thirteen other volumes appeared under the same name,—"Mangona" means rapid sketches,—together with a mass of other work which he executed. As he drew exclusively for the wood-engravers, his original sketches are of extreme rarity. In Japan the drawing is first made on thin paper, then applied to the block and, naturally, destroyed in the production of the woodcut. A few drawings by the artist exist; there are five, we learn, in the British Museum from the collection of Dr. Anderson, and, if we are not mistaken, we remember to have seen in the little Oriental museum of Munich a small gathering of most interesting rapid sketches made in Indian-ink by the exuberant Hokusai, whose art is the most intensely characteristic that it is possible to imagine. The mastery of touch, the rapidity of execution, the extraordinary understanding of the means at his disposal, and the peculiar possession of that indefinable quality of style, render Hokusai's productions,—though, like all Japanese art, outside the ordinary rules of our æsthetic standards,—master-pieces of skilful design worthy to rank beside the finest creations of our European art. He may be regarded, too, in the history of Japanese art, as its most characteristic embodiment. The art of Japan was originally of Chinese origin, and till the last century was singularly wanting in individuality; it was only about 100 years ago that colours commenced to be largely used in the production of the brilliant woodcuts that we all have learnt so freely to admire. In Hokusai's works Japanese art will be found, as we have remarked, embodied in its most striking features, and the school he founded only now threatens to lose its living character through the influence of European art-teachers. Still it must be remembered that it was we Europeans who first discerned the peculiar genius of Hokusai, who now ranks as one of the great artists of Japan.

The French Government have at length determined to institute a triennial *Salon*, the yearly *Salon* being, it will be remembered, in the hands of the artists themselves. The conditions of the Exhibition were published in the *Journal Officiel* not long since. It is not till next year that the exhibition will be held, from the 15th September to the 31st October; all works are admissible produced since 1878. Foreign artists, it may be mentioned, are invited to send in their works.

Egypt.—G. W. Bacon & Co. have published a "Large Print Shilling War Map of Egypt," a rough-and-ready thing, on which you can see at a moment just what you want. It includes, too, enlarged plans of special parts.

TASTE IN FURNITURE.

THERE have always been some critics who, in the midst of the much-vaunted modern advance in taste and art-matters generally, have expressed sage doubts as to the genuineness of the movement. It has become less difficult, it is admitted, to get really artistic work done than was the case some years since; we do not so entirely rely on foreign aid as formerly, but our captious critics are, we are afraid, only too right when they complain that any such work continues to be alone a luxury reserved to the few,—it is not a matter of course, as in the past. It is true that, in the present day, the love of luxury is far more generally spread than formerly; the increase of public wealth, the rapidity with which fortunes are amassed, the new conditions of a democratic society, as shown in the growing uniformity in dress and surroundings, all favour the spread of what a generation gone by were considered as the luxuries of existence. Fashion has further aided the movement, and, as one of its phases, the passion for the collection of *bric-à-brac*, while widely spreading a love of beauty, has developed a desire for the elegant and the superfluous,—a desire looked on as a sign of a certain intellectual refinement. This being the case, can it be said that art has gained? It is one of the qualities of taste that, as it becomes purer and more delicate, it grows more exacting. Now, is modern work more perfect? Treating the matter commercially, as the consumers increase in number the workmen, we are afraid, it will be found, are forced into hasty production to satisfy customers not only capricious and undecided in their desires, but, above all, anxious to furnish in the shortest possible time.

We hear a great deal in the present day concerning foreign competition. Museums and art schools, it is urged, are necessary to educate our workmen and our artists. The Government has warmly aided the work. Museums and schools, therein lies the remedy. On this point public opinion seems nearly unanimous. But under what form are these museums to be organised? In what manner should these schools give their instruction? It is certain that, in spite of the earnestness of those who have devoted themselves to the task, the results are found to be far from satisfactory. It is easy thus far to see the error; but how is it to be remedied? Museums and schools of design are necessary, but they are not an infallible panacea. As has again and again been pointed out, art is not a flower to be forced by artificial means. There are other modes. If our generation does not show in the productions of its industrial art the same perfection as in the past, what is the cause of this decline?

The first and principal cause is the obstinacy which is shown by a large number of persons of refinement in furnishing their houses solely with old objects, or copies of old objects. Every one is acquainted with friends in whom this love of the past has grown into a fanatic fetichism. None more than ourselves admire the beautiful works of the days when the greatest artists were wise enough not to confine themselves to narrow specialities, but vivified by their influence the whole field of industrial art, and stamped its smallest creations with grace and that indefinable quality of style. None more than ourselves have urged the necessity of the study of the work of those days. But we must not crystallise ourselves in our admiration. Is not the domain of the beautiful essentially a field without limits? And is there not a fear that if, from a distrust of ourselves, or inertia, we cease to excite the productive powers of beauty, they may become sterile, and refuse to yield their customary harvest? The sentiment of the beautiful is scarcely less dependent for existence than human nature on a supply of sustenance, and its sustenance is imagination. Now imagination pines and dies when it is not exercised on new objects. Coming to the point, what will be the result of the existing persistent mania which consists in surrounding ourselves only with old-style furniture and more or less servile copies of works of the past?

On the one hand, the designers for the trade seek their motives only from old authorities, and carry out their combinations just as we have machines made, on purely mathematical principles. On the other hand, the manufacturer's aim would lead him to the sole imitation of the old, with the direct result, from want of the creative faculties being

exercised, that the laws on which the old models were produced would be overlooked, or soon become ridiculously burlesqued. Before this happens, is it not time to endeavour to prevent the spread of the misunderstanding which exists between the producer and the consumer? The public must understand that a manufacturer is merely in the position, so to speak, of an echo, answering to the call of the bad or the good taste of the purchaser. On the other hand, again, the manufacturer must understand that the public taste largely depends upon him and his satisfying promptly the demands of that taste. As long as he confines himself to producing old style, the chances are that old style will be all that is demanded.

Remains now another question. The time must come, or there will be no progress marked, when the public will understand the manifest superiority of commissioning and possessing for themselves a work of art, a piece of furniture, or what not, adapted, as was the case in the past, to the individual taste of the patron, instead of being a model made common by wide reproduction, however beautiful. Those who earnestly look forward to a real improvement in the taste of the public look forward to the day when what will be especially appreciated in the interior decoration of our houses will be in each possessing an originality of form, an architectural harmony of *ensemble*, a delicate choice of furniture, in keeping with the surroundings. The fashion for *bibelots* and *bric-à-brac* will have passed away, largely because the *bibelots* will have become impossible to find,—they will be buried away in museums, or their genuineness will be so doubted that the man of taste will avoid the possibility of imposition. Then at last we shall be able to return to the position of our forefathers in the matter of our household surroundings. They never troubled themselves as to whether their furniture was Chippendale or Louis-Quinze, Gothic or Renaissance, if their plate was Queen Anne or Irish. All they exacted was that their surroundings should be elegant, and thus they stimulated and created a race of original artists.

Here, however, an objection presents itself. Admitting that the public will understand the advance of these changed conditions, and surrounded by objects that, instead of diminishing in value with time will increase, as is the case with the works of the past, where is such an ideal public to be found? It can never be anything but very restricted in number. This is where the whole difficulty lies. In the existing state of our industrial arts it is perfectly true that it is alone the possessors of exceptional means who are able to employ artists to design their surroundings or carry out their tastes. This is the evil of the present condition of the industrial art-world, and till some remedy is found we can scarcely venture to vaunt our progress in taste. That eminent critic, the late Charles Blanc, has admirably laid down, in his recently-published "Grammar of Decorative Art," that the laws of taste are happily of so elastic a nature that they are perfectly able to accommodate themselves to different conditions, and are applicable to every degree of fortune. Although it is an essential refinement, taste has no need of wealth for its satisfaction, and a superiority of artistic sentiment has nothing incompatible with the utmost simplicity of condition. Taste, in fact, as has again and again been said, can be displayed as well in a modest habitation as in the most gorgeous palace. Again, it has often been laid down, the beauty of an object may be completely independent of the value of its material; one may produce a beautiful object without its necessarily being costly. This is beyond contest. But is it possible in the present condition of the art-industries to find these conditions fulfilled, always setting aside Japan, which seems to have attained this aim? The cause is only too simple to point out. Take the item of furniture. How is it that the best makers are unable to supply works of special taste at any thing like a price which is within the means of the less fortunate? They will tell you that the mere cost of production, payment of designers, "skilled" workmen, &c., is very considerable. They consequently can only deal with very wealthy customers, and those, even, are not many. As to the public at large, it is simply afraid to think even of such things; it is on the look-out for what is cheap and yet "artistic," and generally finds or contents itself with, what the trade supplies,—furniture which, when not in execrable taste, is of monotonously aggravating style, clumsily copied from old examples. What else can the public do?

Many years ago, for the question has long been disturbing the thoughtful, the Comte de Labarde,—whose share in the great 1851 Exhibition will by some be remembered,—suggested a remedy for the somewhat hopeless position in which the public and the manufacturers were placed. He suggested the formation of an establishment to produce, not for the public, but for the trade,—a series of designs and specimens of work to serve as models to the manufacturers; to carry out, in fact, the aim intended by the Sèvres establishment for ceramics and the Gobelins for tapestry weaving; to introduce art into the smallest objects of existence; and, above all, that they should be suited to the varied uses for which they might be intended.

This scheme, sketched out by an enthusiastic lover of art, a well-known Parisian manufacturer has announced it his intention to endeavour to put into action. He has long been preparing the plans, and in its smallest details he has studied the question. He has provided himself with a model of the establishment, and all the estimates are made out. No detail has been neglected. The interests of all employed will be bound up with the prosperity of the institution. A school of apprentices has been planned, and of a most practical nature, the pupils having each day under their eyes the example of their teachers. This is a most important and too often overlooked point.

The theoretical education at present given is certainly in many points good; but in what does it result? Does it form workmen? Does it not rather simply create artists, who are not suited for their work, and who, on leaving school, ignore the most elementary notions of the work necessary in the workshop, for which they should have been trained, or who disdain the manual labour, the use of which it has never been deemed necessary to show them the necessity? Young men will be found who, after passing four or five years of their life in the study of a profession, are incapable of practising it in such a manner as to gain even their bread; and what is the cause of this powerlessness and disdain for manual labour, at the bottom of all the evil? It lies in the fact that the masters in the schools have been able to give to their pupils only theoretical notions of design, without joining practice to example. To each school should be attached a workshop, in which the young people should, after their minds have been exercised, learn the use of their hands and tools. Under these conditions we may hope for a real amelioration of our art industries.*

THE ENGINEERING CONGRESS AT MAGDEBURG.

THOUGH following somewhat closely the Hanover assembly of architects and engineers (see *Builder*, p. 313, *ante*), the attendance at the above congress was satisfactory as to numbers, and the proceedings throughout were of an interesting character. The business portion of the programme was disposed of on the 27th ult. at a preliminary sitting, so that the time fixed for the duration of the congress itself (28th to 30th ult.) was free for the discussion of various matters of professional interest, and for the festal gatherings which form such a prominent feature of such meetings in Germany.

At the opening sitting on the 28th ult., Herr Wolff, on the part of the Government, congratulated the Union of German Engineers on their assembling for the twenty-third time to discuss matters of interest to the profession. He remarked that in no branch of learning had such progress been made during the last ten years as in engineering, this development having led into new paths many important national industries,—amongst them, those connected with mining, traffic matters, and appliances for lighting purposes.

Herr Born (the Burgomaster of Magdeburg), in a congratulatory address of welcome to the Congress, referred to the fact that the industrial development of the city had been intimately connected with the progress realised during the last quarter of a century by German engineers. Such progress had, he observed, placed the nation on an equal footing with others, which was not the case at one time.

Herr Dittmar (of Eschweiler), the president, thanked the previous speakers for the sentiments they had expressed, and spoke of the encouragement the Union received from the appreciation of their efforts at such a centre of technical industry as Magdeburg.

Herr Peters (of Berlin), the secretary of the Union, reported that there were now 4,400 members, 74 per cent. of these belonging to local unions, and 26 per cent. being in direct communication with the central body. Out of the entire number, 235 are resident in foreign countries. He alluded to the labours of the various commissions which, during the past year, had been dealing with subjects affecting the interests of members, such as the questions of technical instruction in workshops, and employers' liability for accidents.

The scientific part of the proceedings was opened by Professor Fischer, of Hanover, with a paper on "Heating by the Storage of Warmth." His remarks were in some measure only applicable to the system of heating by means of tiled stoves so usual in Germany, respecting which he stated that the comparative thinness of the materials now commonly employed allowed them to give off heat in more or less exact proportion to the rate in which it was supplied to them. In this respect they differed from the old-fashioned stoves. He then alluded to the system adopted in 1843 by Grouvelle, for the improvement of the heating arrangements at the Mazas Prison in Paris. Heating by means of warm water had been known for a long time, and where storage of warmth was required, had been found to answer the desired purpose, but the want of mechanical power in hot water had prevented its successful application to the heating of large buildings. Grouvelle's principle was the utilisation of the mechanical power of steam in conjunction with the previously-known system of heating by means of hot water. The irregularity of the heat thus given off having been found to be a disadvantage, the efforts of those interested in that branch of engineering had of late years been directed to obtaining uniformity in the supply of heat, and according to the Professor's theory, this end is best attained by the water reservoir being placed in the cellars, the water being there heated by fire from underneath. The insertion of a stop-cock provides for the supply of the water to the serpentine pipes leading upwards, and for the regulation of the amount of heat. He remarked that it is without any real influence on the heat given off whether water or steam be employed, but he pointed out that with steam heating a comparatively large quantity of steam is used in the first instance, and hence a boiler of somewhat large dimensions is necessary. In conclusion, he stated his opinion that heating by means of the storage of warmth is only to be recommended where the mechanical arrangements allow of a uniform heat being maintained if necessary, while also providing for the increase or decrease of the supply, as may be found advisable. He attached particular importance to the storage of heat being arranged in such a way that there should be no difficulty in shutting off the heat from the rooms thus served to any extent which might be found desirable by its occupants, this regulation of the supply of heat being rendered specially necessary by the variable nature of the German climate.

In his paper dealing with "The Technical Application of Electricity," Dr. Zexener referred to the invention of an electrical machine in 1630 by Otto von Guericke, a citizen of Magdeburg, and claimed for him a priority of discovery in this branch of science. With reference to the electric light and its application to domestic lighting purposes, he spoke of the successful attempts of Herr Von Hefner-Olteneck to remedy certain imperfections of some systems, such as that by which the extinction of one light used to involve the extinction of the entire circuit of lights. He also spoke of a German invention which permits of the easy renewal of the filaments of carbon in electric lamps, which by their yellowish light seem likely to be more appreciated for many purposes than those which have the white light first known in connexion with electric illumination. He dwelt further on the advantages of lighting railway carriages by electricity, on which subject deliberations and experiments are now being carried on by railway administrations at Frankfürt and Strasburg. The lighting of railway carriages by gas caused an un-

*. The above is a free rendering of an article by M. Victor Champier that appeared in the pages of the March number of the *Revue des Arts Décoratifs*.

pleasant odour at times in the carriages and on the platforms. By means of the Faure accumulator, there is no danger of the extinction of the light from the stoppage of the train, although the motive force for the electrical apparatus is furnished by the rotation of the wheels. He likewise referred to the trials of transmission of electric force over distances of some magnitude, which will form a feature of the programme at the Munich Exhibition, and which it is expected will be of advantage to the cause of electrical science, particularly with reference to the question of electric railways.

The second day's proceedings were of varied interest, and included papers on "The most recent Improvements in Sugar Manufacture," "Progress of Boring Science during the last Ten Years," and "Salt-mining in the Stassfürt District." In connexion with the last-named subject an interesting excursion had been organised to Stassfürt.

On the closing day of the congress a number of interesting matters were brought forward for discussion. Herr Peters (the secretary) proposed that the necessary communications should be entered into between the Union and the German Government for the establishment of a fixed remuneration for engineers summoned as judicial experts, on the basis of the scale laid down by the Engineers' Congress at Gotha. This scale was as follows:—4s. per hour at their own houses, or 5s. per hour out of their dwellings, but in the same town. As to matters which involved travelling, it was suggested that the scale of remuneration allowed to attorneys in similar cases should be made legally applicable to technical experts.

Professor Inze, of Aix-la-Chapelle, spoke of the advantages arising from the adoption of normal models for rolled iron. The same member also referred at some length to the measures which the Union of Engineers was taking in conjunction with the Architects' and Engineers' Union to bring about the rational utilisation of the water-power of the German rivers. The sanitary advantages of the regulation and purification of rivers were dwelt on by him, and the instance was cited that, in a department of France where such measures had been carried out, the mortality sank from 40·5 to 25·4, and the average duration of life increased from twenty-five to thirty-five years, while the number of recruits who were not up to the medical requirements of the military regulations diminished from 52 per cent. to 9 per cent.

The excursion by boat to the Herrenkrug Park was an interesting feature in the proceedings of the congress. Messrs. Faber, the printers, presented each member of the congress with a large card of welcome, which was printed in presence of those members who visited the works in a body.

SALTBURN-BY-THE-SEA.

ONE of the pleasantest, though not the best known, of the bathing-places on the north-east coast, is that of Saltburn-by-the-Sea. It is comparatively new, and, depending largely upon the patronage of the large towns near it, it has felt keenly the depression in trade in the last few years, though its natural attractions are now again drawing numbers to it. It may be described as the extreme north-eastern point of Yorkshire, and is built on a bold bluff that overlooks Huntcliff Foot, one of the prominent cliffs on that coast. Down to a score of years ago there were at Saltburn only the old hamlet,—a few houses scattered around a conical little hill, and noted as the past resort of smugglers. The site was judged suitable for a new watering-place, and in 1863, the Zetland Hotel, erected at a cost of 40,000*l*., was opened, and the new town shortly afterwards sprang into being. It is built on the top of the cliffs, 150 ft. above the sands, and whilst, on the one hand, these yellow sands stretch uninterruptedly for miles, on the east a deep glen, with almost precipitous sides, has been laid out as pleasure-grounds, and shows a mass of diversified foliage, beds, lawns, temples, and terraces. From the end of this a thick wood extends to beyond Skelton Castle, the ancient home of the great De Brus family, and in later years the resort of Sterne. This Skelton Glen, at Saltburn, is spanned by an elegant girder bridge, and the new town, its erections and appliances, point to the aim to fit it for the comfort of pleasure-seekers.

By sea and land its views are stately rather than magnificent. The gardens, from the seaward entrance to the Spa that terminates them, present many a striking landscape, especially when the bold bluffs of the hills are seen through the leafy screens, or the "iron reservoirs" of Cleveland present their bare peaks to the eastwards, with well-wooded valleys between, and occasional mansions such as that of Rushpool Hall striking sharply and clearly out from the steep sides of the glen. Seaward, magnificent views are seen. To the south there are at the little rivulets' mouths ancient fishing villages such as Staithes and Runswick, the abode of a hardy race of fisher folk; whilst to the north-east, clearly and distinctly, the manufacturing towns of the north are seen beyond the "golden sands," or across the estuary of the Tees. From these, "beneath their smoky veil," the eye travels along the sandy coast, dotted with one or two abodes of the iron manufacture, till it sees the ancient village of Marske and its now disused church on the higher ground, and then along the sand-banks and the cliffs that grow ruddy until the white-bricked houses of Saltburn glisten, and thence across the glen to red Huntcliff. Little streams brawl noisily down the glens, where thick woods cluster; but beyond these the country has a moorland aspect, and the mining village that dots the rising ground towards the hills gives it unwonted animation. It is a region that was sparsely peopled, remote, and unknown; industry has developed the mineral wealth of its hills, and for the rest and recreation of some of those so brought to the district, several seaside resorts have sprung up, not the least attractive of which is Saltburn-by-the-Sea.

In the past few months there have been indications of improvement at Saltburn, and in the district near it. The last link of the new line of railway that is to connect it with Whitby is just about completed; there has been a considerable revival in the demand for crude iron, and this will give to the iron mining district that belts Saltburn a marked impetus; and after long idleness the whole of the district seems to feel new life. The long-empty houses are filling, and the art of the builder is being again called into requisition. The sanitary organisations are busy, and there are all the signs that in the course of a few months there will be a further marked improvement in the district. The cloud that hung over the commerce of Cleveland has been lifted, and with brighter prospects there are to be expected brighter times for the pleasant health resorts that become barometers of the trade and commerce of the country.

THE PRESERVATION OF ANCIENT MONUMENTS IN SWITZERLAND.

THE time when as good as nothing was done in Switzerland for the preservation of ancient monuments of art is fortunately over. There has been a hard struggle for it; but now existing societies do much in this direction, and intended destruction is prevented by prompt action. It looked for some time as if the government of one canton (the town of Basel) were on the point of sacrificing one of the most beautiful choirs. It was proposed to take down the Barfüsserkirche at Basel,—dating from the beginning of the fourteenth century, and let in recent years as a warehouse,—and to use the site for the erection of a school. This scheme would probably have been carried out, but steps have been taken, the result of which will be the preservation for future generations of art-lovers of the most imposing and, next to that of Cologne Cathedral, loftiest choir on the Rhine. Basel Minster, also a most imposing edifice, and erected in the beginning of the eleventh century (by Emperor Henrich II. of Germany), is likewise undergoing thorough restoration. The works are proceeding very satisfactorily; the two beautiful western towers, visible from a considerable distance, have been restored, a great deal of labour having been spent upon them during the last two years and a half. It appears now that the works were highly necessary if the noble building was not to suffer to such an extent as to render later renovation almost tantamount to re-erection. The progress of those works and the rejuvenation of the venerable Basel Cathedral have given a fresh impulse to the work of restoration also elsewhere in Switzerland. At Bern, for instance, the question of completing the Minster there has been much ventilated. An acting committee has lately been considering a report by Oberbaurath Egle, of Stuttgart, on the possibility of completing the unfinished tower. A Geneva architect (Herr Leemann) has been occupied for some time in executing a large model of Bern Cathedral, as it would appear with the tower completed according to the original plans. The cathedral was begun in 1421, completed in 1573, and restored in 1850; but the tower was never finished, and is at present only 134 ft. high, and covered with a clumsy-tiled roof; but, if properly carried out, it will be of colossal dimensions. The model will not fail to incite the Bernese to exertions in the matter.

THE NEW COUNTY PUBLIC OFFICES, FISHERGATE, PRESTON.

THESE buildings have been designed to group with the buildings adjoining, which were erected in 1878 for the head quarters of the county constabulary. The whole pile is now completed, and occupied by the officials connected with the transaction of the county business. The character of the design adopted by Mr. Littler, of Manchester, the architect, is a modification of the style prevailing in the reigns of Elizabeth and of James I., and partaking rather of that known as Jacobean than that of the earlier period. The external facings of the walls are of red pressed bricks, with stone string-courses, cornice, window quoins, mullions, and other dressings. On the stone shields are carved the royal arms, the arms of the Duchy, and those of the House of Lancaster. The whole block has a frontage to Fishergate of 180 ft., and to Pitt-street of 184 ft., inclusive of care-taker's house and intervening gateway to court-yard.

In order to utilise to the greatest advantage the area of ground afforded by the site, an open inner court is formed, around two sides of which the offices and other apartments are grouped. The walls of the court are lined with glazed white bricks. A central corridor on each floor gives access to the various rooms and offices, which face the public thoroughfares.

The ground-floor, which is 4 ft. or 5 ft. above the street level in Fishergate, is occupied by the Clerk of the Peace and his staff; and on this floor there are two staircases and two entrances. The principal entrance is from Fishergate, and the first glance of the interior gives the impression that the work is in every respect worthy of the county. Facing the entrance is a long corridor leading to the various offices, the record-room (which is fireproof), and the dining-hall. On the right is the porter's room and the office of the second Deputy Clerk of the Peace; and on the left the office of the Clerk of the Peace, and the Deputy Clerk of the Peace. On the opposite side of the same passage is a room occupied by the clerk to the Clerk of the Peace, and a large general clerks' office. All these rooms are elegantly and substantially furnished. We next pass the way down to the basement, which is lined with white glazed bricks, specially made. In the long corridor, on the right, are the lavatory, the court crier's room, and two rooms occupied by solicitors, who are assistants to the Clerk of the Peace. On the left hand are the library, the stationery-room, and large record-room for the Clerk of the Peace.

We next ascend the grand staircase, with tiled walls and wrought-iron balustrade, to the first floor. Here are found similar suites of rooms to those below, which are occupied by officials connected with the financial business of the county. The county treasurer's office is a handsome room, and adjoining it is that of his chief clerk. The next office is that of the county auditor, and on the opposite side are commodious rooms for his clerks. At the end of the passage is a door leading to the constabulary department. The room allotted to the second clerk to the county treasurer is the most handsome one in the building as regards fittings, and no little ingenuity has been displayed in the compactness and convenience of its arrangements. The joiners' work is of pitch pine, most carefully selected, and the markings of the wood are of extreme beauty. Such choice specimens of pitch pine (French polished) as have been used in all the fittings throughout the building are rarely seen; and a timber merchant speaking in reference to the room in question

where there was a good opportunity for the display of workmanship, said, in expressing his admiration, "The man who has done this deserves to be knighted." Passing down the corridor, on the left, are rooms for clerks to the county treasurer and auditor, and the record-room connected with their departments. On the right is the committee-room, with ante-room and lavatories. At the end of the corridor we reach the large hall, or court-room, for the county magistrates, in which they meet for the transaction of the county business. Here the decorators have had an opportunity for the display of their ability. A pamphlet has been prepared by Mr. C. R. Jacson, J.P., the most active of the county magistrates, descriptive of this room, and the picture-subjects, heraldic devices, badges, and mottoes on the walls and windows. The dimensions of the county sessions hall are 62 ft. by 45 ft., and it is 36 ft. high, with an open-timber roof in character with the style of architecture of the building. It is lighted by a lantern-light in the roof, and by large windows with semicircular heads, having stone mullions and transoms, glazed with head-lights of suitable design. In connexion with the court is a retiring-room for magistrates, an entrance, and a platform for the public. The court-room fittings are all of pitch pine, darkened to harmonise with the walls; and accommodation is provided for about 200 magistrates, in addition to the county officials and reporters to the newspapers. One of the staircases already mentioned is continued up to the second floor, or attic story, in which additional office room and store rooms are provided.

Descending from the court-room we reach the luncheon or dining room on the ground floor, which is wainscoted with pitch-pine. Every panel in the framing is a specimen of well-marked wood.

The court-room, corridors, and offices are warmed by hot-water pipes, in addition to open fireplaces in the principal rooms, the apparatus in use being that of Messrs. Metcalf & Dilworth, of Preston. The offices are all connected by speaking-tubes, and by telephone to distant parts of the town, so that the officials can communicate with each other, and in any direction, without leaving their rooms. Hydrants are provided on the staircases and corridors, and extincteurs are at hand for the purpose of extinguishing fire. The floors of the corridors and record-rooms are carried on brick arches, and the floors laid with marble concrete of a grey tone.

In the basement are the kitchens, scullery, hoists, stores, hot-water apparatus, and strong-room for the deposit of valuable parchment records. Along the corridors are rooms in which the county registers, election papers, ballot-boxes, &c., are kept for each division of the county. There are rooms for the storage of plans which have to be deposited with the Clerk of the Peace, and documents which are least required for reference. One or two minor officials,—such as the bridge-master and the cattle-plague officer, have quarters in the basement.

Mr. John Walmsley, of Preston, has been the general contractor for the erection of the building; and Messrs. David Tullis & Son have done the masons' work, as sub-contractors under Mr. Walmsley. The County Hall has been decorated by Messrs. Shrigley & Hunt, of London and Lancaster, under the supervision of Mr. Hunt, from designs by Mr. E. H. Jowitt and Mr. J. Milner Allen, of London, who have executed the same. The furniture has been made by Messrs. Bell & Coupland, of Preston; and the whole work is done in a satisfactory way, and reflects credit upon the contractor.

The entire cost of the building and site (constabulary offices included) has been 58,000*l*.

Previously to the erection of this block of buildings, which is within two or three minutes' walk of the railway station, the various public offices were scattered, and documents were stowed away in boxes, cupboards, and drawers, some at one place and some at another, wherever room could be found for them; and the magistrates had to meet at the Court House, more than a mile away. All are now brought together under one roof, which is a great convenience, not only to the officials, but to the general public who may have county business to transact.

To the foregoing general description of the buildings we add some particulars of the decorations. Generally speaking, the scheme of decoration is as follows:—An attempt has been made to illustrate the history of the county in its relation to the national history by means of picture subjects, portraits, heraldic devices, badges, and mottoes, and to indicate the chief use of the hall by appropriate inscriptions. The history of the county palatine is interwoven with the history of England from the earliest period. The legends of the county are found amongst those which appertain to the country at large. The pictorial subjects represented in the semicircular heads of the panels are as follow:—South wall.—Combat between Sir Tarquin and Sir Lancelot du Lac, the Roman Castle of Manchester in the distance. According to Roby, Sir Thomas Mallory, and other writers, these two knights were resident in Lancashire (the one near Manchester, the the other near Martin Mere). The shields flanking this subject are, dexter, King Arthur; sinister, King Edmund the Martyr, 2. Alfred dividing the kingdom into shires. hundreds, and tithings,—dexter shield, Alfred the Great; sinister, Edward the Confessor. 3. William I. granting what is now Lancashire to Roger de Poictu (so called from his having married Alwood Poictu), the great Baron of Lancashire, as a reward for the services rendered by his family to the Conqueror,—dexter shield, William I.; sinister, Roger de Poictu. 4. John granting Magna Charta,—dexter, King John; sinister, Simon de Montfort. West wall.—5. Marriage of Henry VII. and Elizabeth; union of the houses of York and Lancaster,—dexter shield, Henry VII.; sinister, Elizabeth of York. 6. Crowning of Henry VII. on the field of Bosworth,—dexter, Queen Elizabeth; sinister, the Duchy of Lancaster. North Wall.—7. James I. at Hoghton Tower,—dexter shield, Tyldesley; sinister, Hoghton of Hoghton, created baronet, 1611. 8. The Defence of Lathom House,—dexter shield, Charles I.; sinister, Stanley—Lathom. Heraldry:—South wall, in panels (below the historical subjects).—King John, *Comte sans terre*, made Earl of Lancaster by Richard Cœur de Lion; William Radcliffe, sheriff, A.D. 1194; George McCorquodale, present high sheriff; Henry III.; Edmund Crouchback; Edward I.; J. Wilson Patten (Baron Winmarleigh) and Sir Benjamin Heywood, the two last representatives of the entire county; Edward III.; Henry Grismond, first duke of Lancaster; Sir Henry de Haydok, chancellor of the first Duke of Lancaster. Westwall.—H. M. Victoria; John o' Gaunt; Richard II.; Henry IV., first monarch of the Lancastrian line. North wall.—Henry VII.; Elizabeth; Edward, Lord Stanley, first lord-lieutenant of the county; Molyneux, of Sefton; Gerard le Bryn. The side panels throughout the hall are filled by the rose of Lancaster. South wall.—Returning to the doorway leading to the magistrates' bench, we have portrait illustrations of some of those who by their enterprise, invention, perseverance, skill, and refinement, have contributed to the greatness, wealth, and happiness of the county. 1. Francis, 3rd duke of Bridgwater, representing Enterprise. 2. Sir Robert Peel, 1st. Bart., Commerce. 3. Sir Robert Arkwright, Kt., Manufactures. 4. Crompton, Invention. 5. Roscoe, Literature. 6. Whitaker, History. 7. Holker, Jurisprudence. 8. Romney (Fine Arts), from a portrait of the artist by himself, in the possession of John Romney, esq., of Whitestock Hall, Ulverston. The female heads in the picture represent a well-known favourite subject of the artist. 9. Whewell, Science. The hall roof, five panels in height, is decorated with the arms of the Duchy, with the addorsed Talbot supporters, the Lancashire rose crowned, and the motto "Dieu et mon Droit," in the upper and lower two panels, the central band having a blue field on which are the rose, thistle, and shamrock, with the national mottoes, "Dieu et mon Droit," "Nemo me impune lacessit," "Quis separabit." The panels of the lantern roof are devoted alternately to the feather, and the falcon and padlock badge of John o' Gaunt, and the feather entwined with a garter, with the motto "Sovereygne" of his royal son, Henry IV. In the windows are set forth the badges of all the English sovereigns from the Conquest to the present day, as follow:—South side: 1. Norman. 2. Plantagenet. West side: 3. Plantagenet. North side: 4. House of Lancaster, Henry IV. 5. House of Lancaster, continued. 6. House of York. 7. House of Tudor. East side: 8. House of Tudor. 9. House of Stuart. 10. House of Hanover. The east wall, below the spring line of the window-heads, is decorated with the arms of the four Quarter Sessional Boroughs of Manchester, Liverpool, Bolton, Wigan, which occupy the central spaces between the windows. The two outer spaces contain the principal boroughs (not already named) of the six Hundreds,—Lancaster, in the Hundred of Lonsdale; Preston, in the Hundred of Amounderness; Blackburn, in the Hundred of Blackburn; Chorley, in the Hundred of Leyland; Salford, in the Hundred of Salford; and Warrington, in the Hundred of West Derby. Above the window-heads the wall is diapered with the C.P.L. (County Palatine of Lancaster) alternating with the Lancastrian rose. The shields of the remaining boroughs are disposed upon the west wall and below the corbels on the north and south walls, and the remaining wall space is diapered upon a full green field with the initial letter "L" enseigned with the royal crown. Over the principal entrance of the court are the arms of the county carved in wood. The court is lighted by two gaseliers of wrought brass. It is intended to fill the staircase window with coats of arms, illustrative of the history of the County Palatine.

It was intended that the new County Sessions Hall should be opened on Thursday in the Guild week (7th inst.), by the Duke and Duchess of Albany; but, owing to the illness of the Duke, the ceremony has been postponed to Thursday next, the 14th inst., when the Earl of Derby will open the courts, and deliver the inaugural address, in his official capacity as chairman.

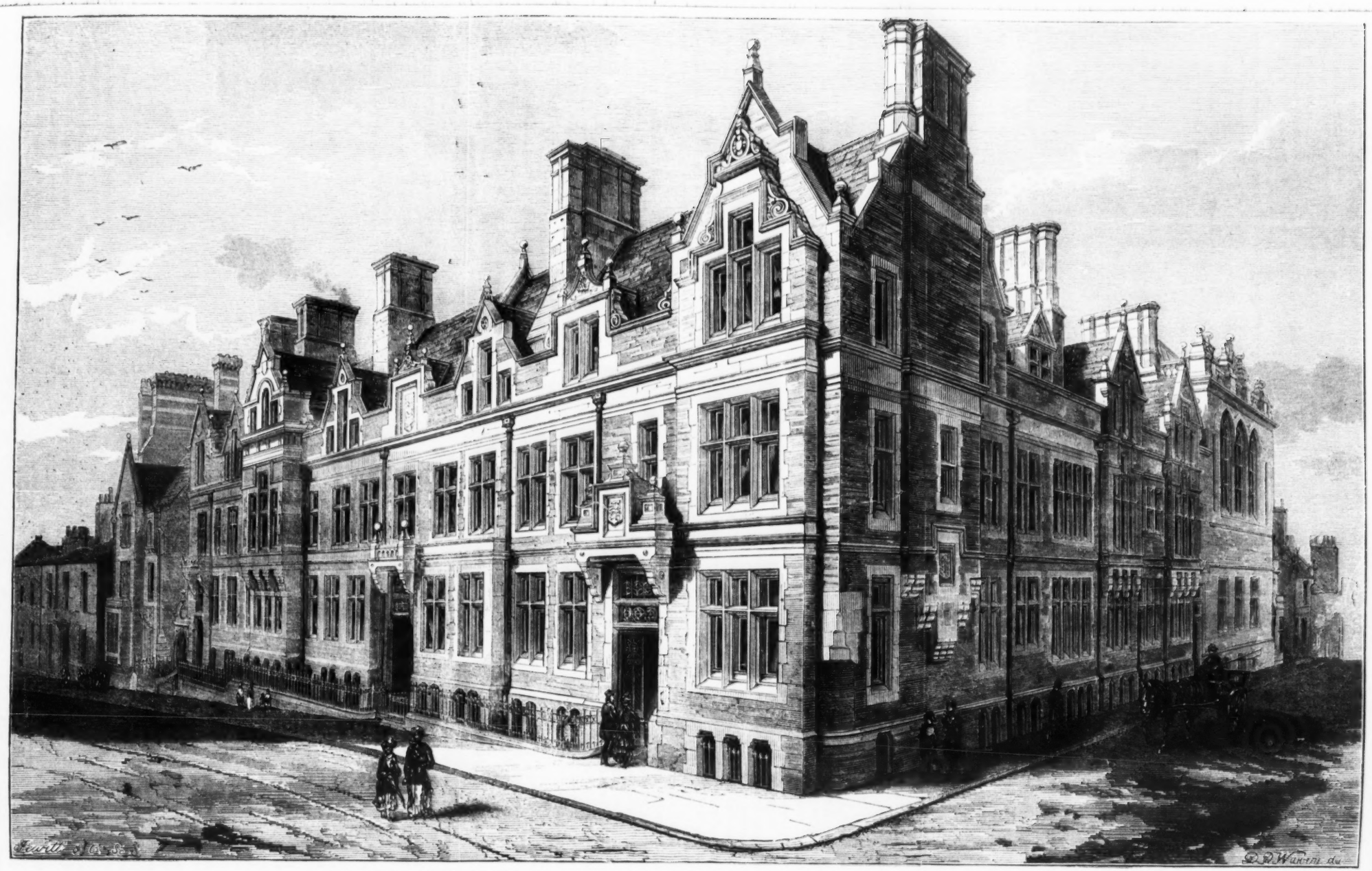
THE PRESENT SITUATION OF THE BUILDING INDUSTRY IN GERMANY.

THE Union of Master Builders (numbering 4,200 members) has presented a petition to the German Government on the subject of re-introduction of the test-examination for masters. It is urged that the present freedom of admission to the trade is doing injury to it, and is also prejudicial to the interests of the State and of the public at large. The petition goes on to explain that building is an industry which requires all possible assistance from science and art, and that the development of building has at all times been a proof of the general culture of a nation. Thus it is argued that it is unwise to allow persons completely devoid of scientific and technical knowledge to exercise a calling of this nature. It is remarked that the fact of unqualified persons being in the trade imposes upon the public unnecessary trouble and expense in guarding themselves against the dangers of giving work into incompetent hands.

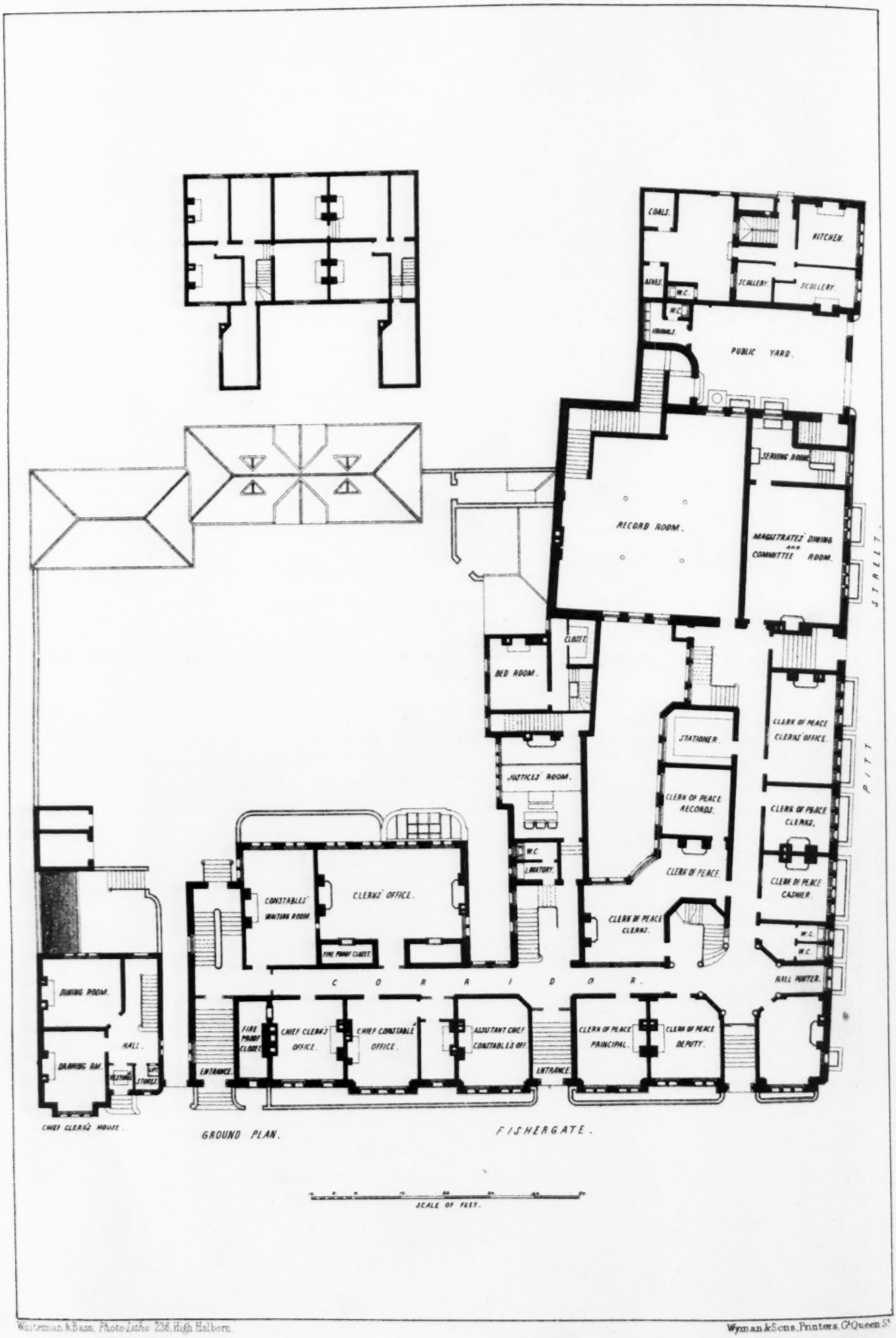
In support of the scheme for a test-examination it is urged that the younger members of the trade are anxious to have a definite object in their studies, and are desirous of having their qualifications vouched for by competent authorities.

In conclusion, it is argued that the proposed restrictions on admission to the building trade are no more a violation of commercial liberty than are the tests which are usual in other callings, of which the unrestrained exercise by incompetent persons would be dangerous to the public safety, the analogous cases of apothecaries, sea-captains, pilots, &c., being brought forward in support of this view of the subject.

Fall of Buildings.—An accident that might have been attended by serious results occurred on the 30th ult. at the National School, Mellor, Blackburn, which is being rebuilt. It is stated that a gable had been run up very rapidly to the height of 20 ft. The heavy rains had kept the mortar soft, and some of the stonework fell. The men at work on a scaffold were precipitated to the ground, and one of them had a narrow escape. Two wallers, named Beattie and Mycrop, were injured, one having an ankle sprained and the other being cut about the head. On the same day a joiner named John Woods was working inside the Mason's Arms Vaults, Salford, when he narrowly escaped with his life from a heap of falling building material. The building was being demolished, and two men were engaged pulling down the fire-range on the ground-floor, whilst Woods was pulling up the floor-boards in the second story. They called out to Woods to come and assist them, and he replied, "In about a minute." Immediately they heard a crash, and rushed out of the building, which fell inwards. Woods was buried in the fallen ruins, and when extracted he was found to be suffering from injured ribs.



THE NEW COUNTY PUBLIC OFFICES, FISHERGATE, PRESTON.—MR. LITTLER, ARCHITECT.



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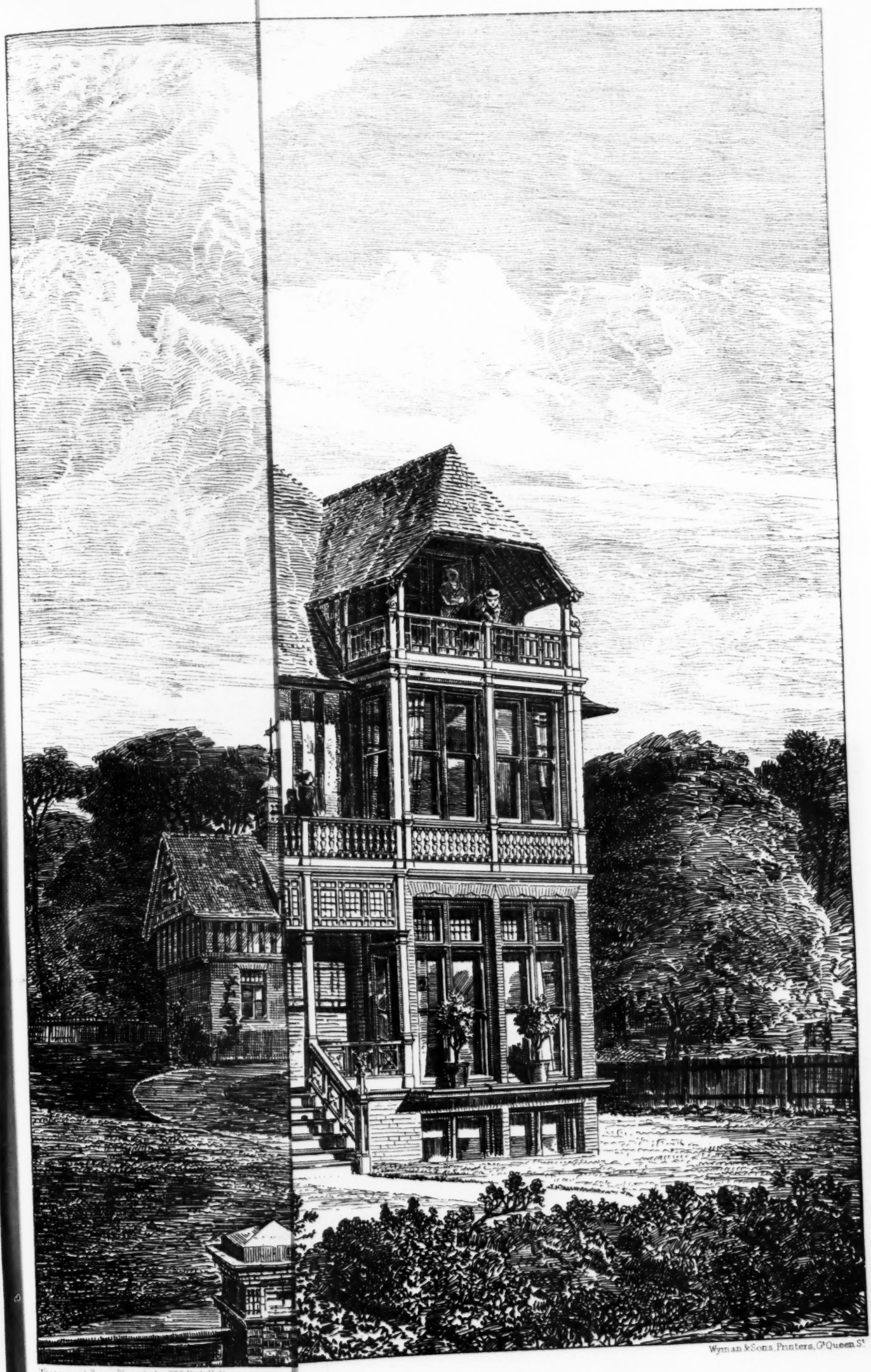
THE COUNTY PUBLIC OFFICES, PRESTON.



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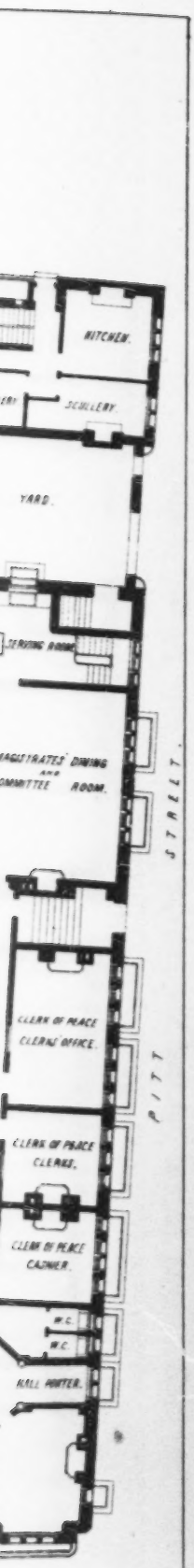

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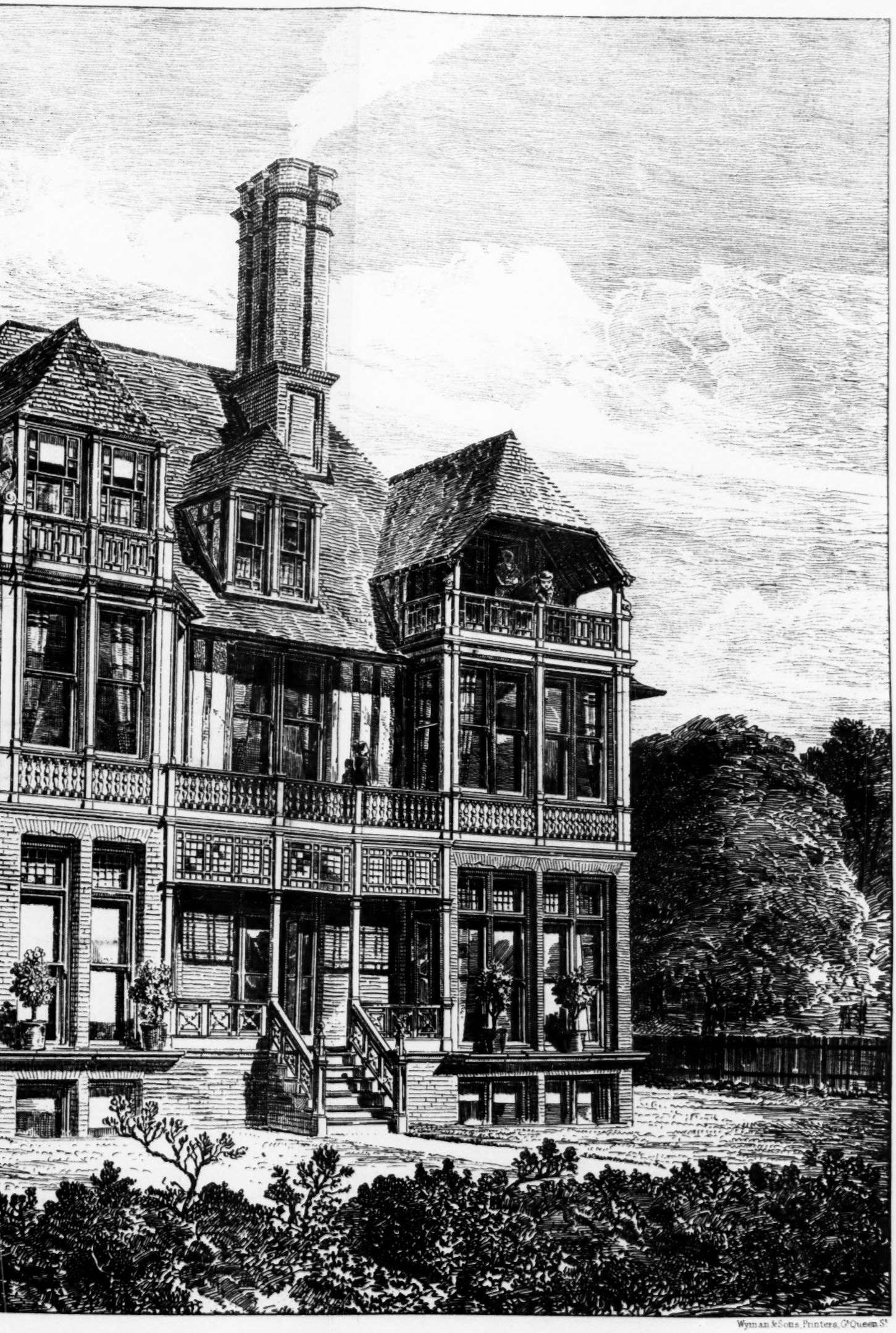
MARINA HOUSE, WALMER, KENT.—



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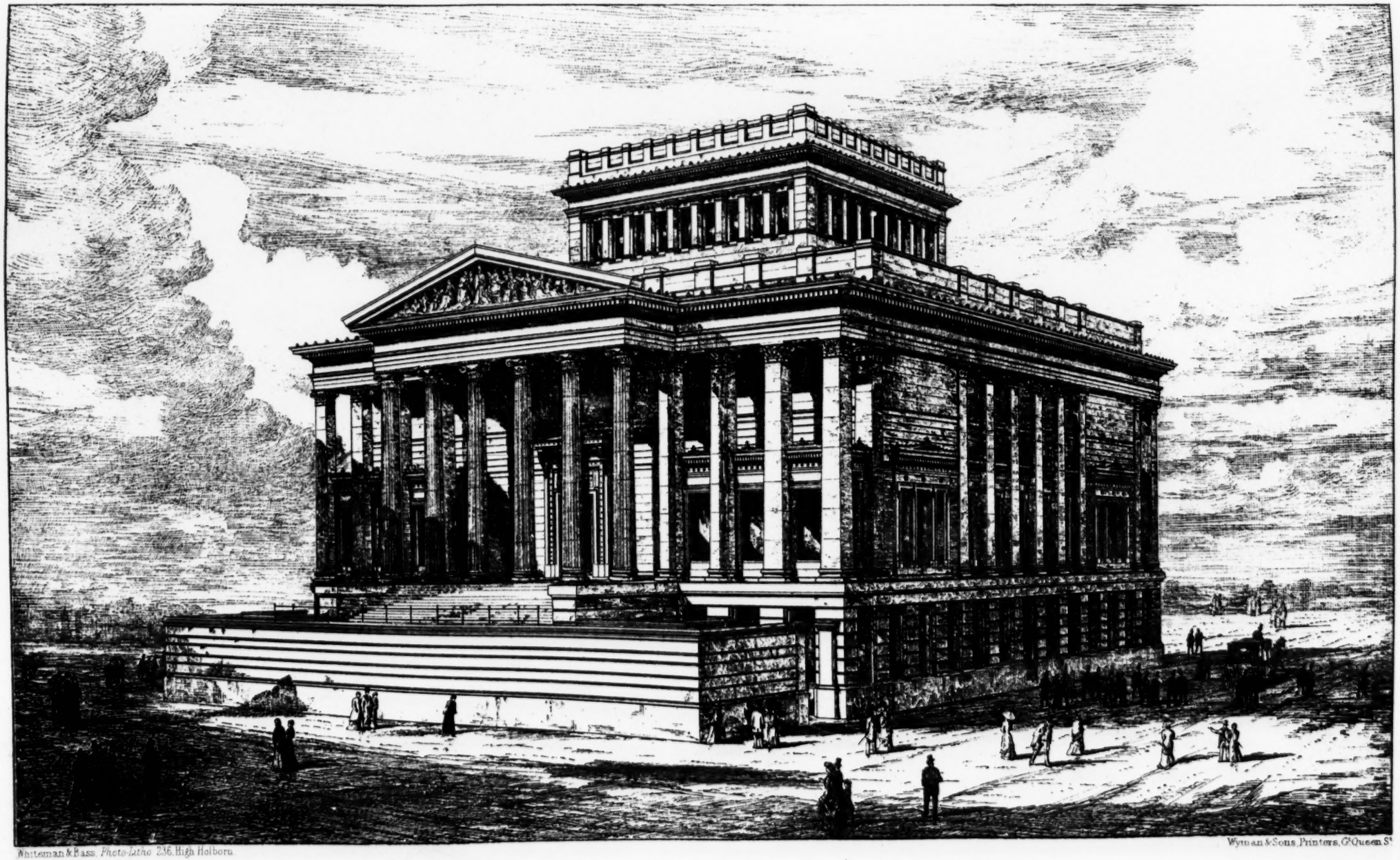
T.——Mr. James Neale, F.S.A., Architect.



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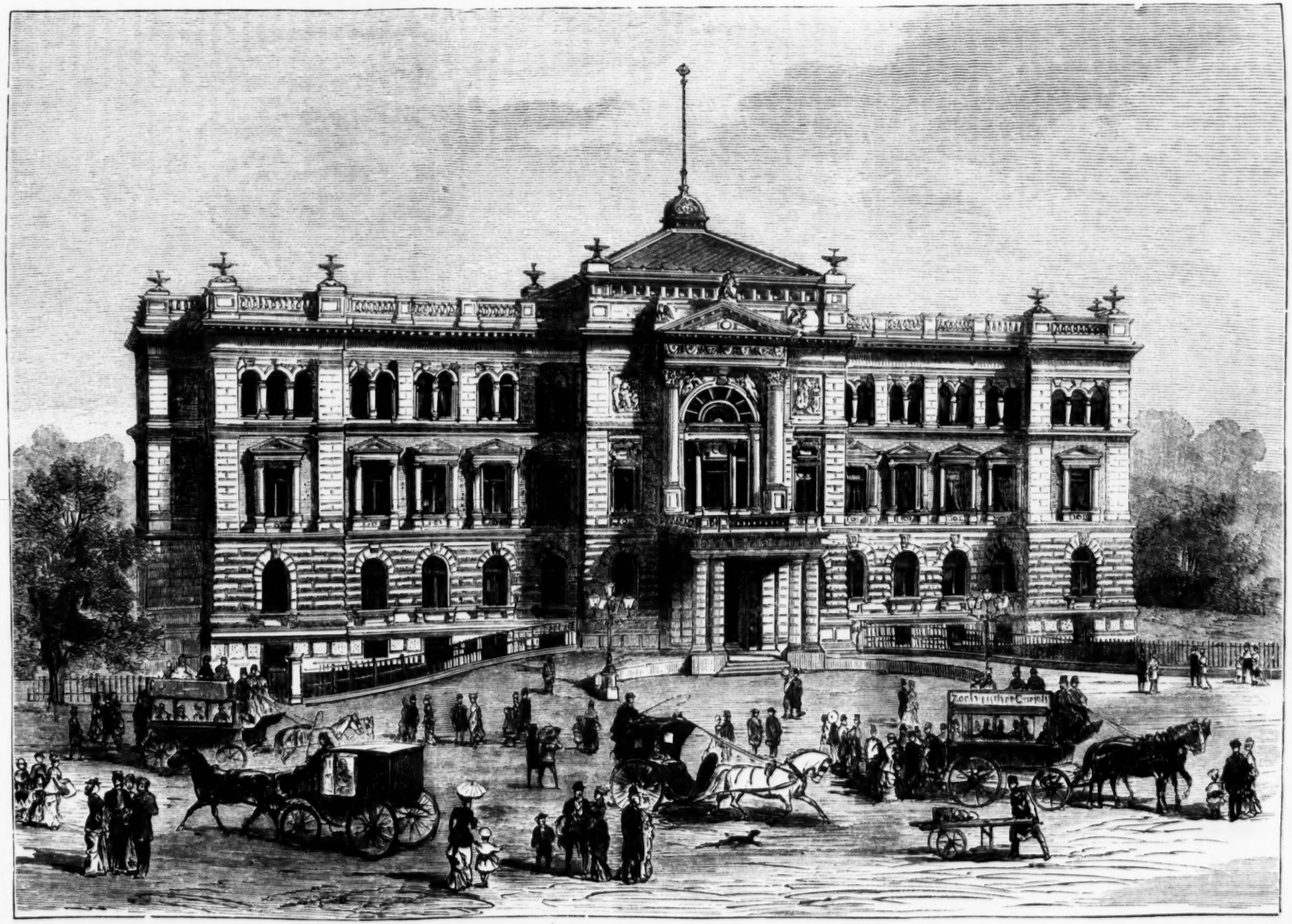
THE HARRIS FREE PUBLIC LIBRARY AND MUSEUM, PRESTON.—Mr. James Hibbert, Architect.



THE NEW PROVINCIAL ESTATES HOUSE, HANOVER.—Herr F. Wallbrecht, Architect.

THE HARRIS FREE PUBLIC LIBRARY AND MUSEUM, PRESTON.

THE foundation-stone of this building was laid on Tuesday last by the Earl of Lathom, with Masonic honours. The ceremony was to have been performed by H.R.H. the Duke of Albany. We described the building at some length in a previous number,* and we now give a view of the proposed building and a plan of the principal floor. For convenience sake, it may be as well to repeat a portion of what we then said, with some further particulars.

The designs have been prepared by Mr. James Hibbert, who was commissioned by the Harris Trustees to visit several buildings of a similar character in this country and on the Continent, the result of Mr. Hibbert's visit and report being that he was appointed the architect to prepare the designs.

The building will be of the Greek Ionic order, and will have four distinct frontages, being completely isolated from the buildings around it. The principal elevation is on the west side, overlooking the market-place, and almost at right-angles with the north frontage of the town-hall. The height of the frontage to the parapet and the apex of the portico is 80 ft., and the extreme height to the top of the central lantern, 112 ft. The portico consists of six massive fluted columns, with bold capitals. It is surmounted by a bold overhanging cornice, and the tympanum is filled in with a group of figures representing Minerva surrounded by Literature, Science, and the Arts. The frontage is 130 ft. The bases of the columns of the portico and its floor level are about 10 ft. above the street level, and the entrance to the building is under the portico by flights of steps on the north and south sides. Immediately under the tympanum of the portico is the carved inscription in large characters,—"To Literature, Science, and Art." The eastern elevation of the building faces Lancaster-road, a fine thoroughfare about 60 ft. in width, leading out of Church-street, the principal street in the town. It is uniform in length with the Market-place frontage. The north and south frontages are each 170 ft. in length, and will face two new streets, each 50 ft. in width, which are about to be constructed in connexion with certain town improvements intended to be carried out simultaneously with the erection of the Free Library buildings.

The collection of models connected with the industrial arts will be placed on the ground-floor portion of the central hall, with the object of bringing them under the daily observation of visitors passing to and from the lending department and the adjacent reading-room and newsroom. The newsroom on the south side, and the reading-room on the north side, are each 29 ft. by 55 ft.; one of the lending libraries is 50 ft. square, and the other 55 ft. by 29 ft. The central hall is 54 ft. square, and is continued, by the staircase, on all the floors, being lighted by the lantern immediately over a central well. The principal floor contains the reference libraries, on each side of the central hall. They are each 30 ft. in width, and 120 ft. in length. The central hall portion of the principal floor will be set apart as a museum of casts and reproductions from the antique. On the principal floor there is also a conversation-room, and a room for chess and draughts. The whole of the upper floor will be devoted to museum and fine-art purposes. The museum galleries are arranged round three sides of the central hall and staircase, one side being devoted to the fine arts, the corresponding side to natural history and physics, and the remaining side between these to the department of general archæology, ceramics, and the finer kinds of industrial art, and illustrations of ethnology.

Adopting the statement of the architect, for the fine-art galleries time will be required to form a permanent collection that can be considered equal to the objects in view; but meanwhile much may be done in utilising them for exhibitions of the works of living artists and of loan collections. The pecuniary means, however, immediately at command would purchase, for instance, such examples as a complete series of the publications of the Arundel Society, consisting of fac-simile reproductions, in chromolithography and engraving, of paintings in fresco by the old Italian and German masters, which might be framed and placed in the galleries. An historical collection of engravings and etchings arranged in the order of the various schools and masters would equally be attainable. Autotypes, also, on a large scale, of famous paintings in the great European galleries, and characteristic works like the "Liber Studiorum" of Turner, are now procurable. Illustrative examples such as these, though not costly, are of greater interest, and certainly of higher value in educating the public taste than thsoe mediocre specimens of the works of living artists which form the greater part of our annual exhibitions. Modern pictures, that is, those of living artists, can only be very sparingly bought with the endowment fund, and even those only need be purchased which exhibit the best elements of the school to which they belong.

The central hall and staircase are proposed to be devoted principally to works of sculpture after the antique and later schools, and may be rendered, in a degree, somewhat unique in a provincial town. The friezes and metopes of the Parthenon, of the Temple of Theseus at Athens, and the frieze of the Temple of Apollo Epicurius at Phigaleia in Arcadia, may not only be among the models presented of the best Greek art, but can be arranged so as to form the permanent architectonic decoration of these parts of the interior. Some of the finest works of Greek and Græco-Roman statuary, as well as of the later masters, in fac-simile reproductions, may be purchased out of the funds immediately available.

The architect justly observes:—"The character of the design is academical, conceivably the most appropriate. Influenced by studies of Ionian art, its chief features are simplicity and symmetry of plan, truthfulness of expression, and, in execution, refinement of detail. In the plastic arts, as in literature and geometrical science, the Hellenic race has reached the highest standard. If Greek architecture is to be retained in practical service, it is requisite, when opportunity affords, to present new combinations of its forms. For the purposes of a library and museum, — a repository of knowledge, of examples of the arts, and of specimens illustrative of the sciences,—its suitableness will be admitted. There are fashions in architecture, as in most artistic productions of the time. A structure, however, that is fit for its uses, subserves its distinctive functions, and is in harmony of expression with the nature and quality of those functions, stands above the fluctuations of ephemeral taste. Such, in this instance, is the object to be sought and endeavoured, as far as the building is concerned,—the production of a work of permanent value, an example of memorial art."

The design has received the approval of the Harris Trustees, and they have resolved to devote 70,000*l.* of the funds of their trust to its execution, with all the attendant expenses.

* See p. 285, *ante*.

MARINA HOUSE, WALMER, KENT.

WE illustrate another of the several houses which have been erected by Mr. Alexander Tod at Walmer, from the designs and under the porsonal superintendence of Mr. James Neale, F.S.A., of Bloomsbury-square, London.

The house is situated on the beach, and commands uninterrupted sea views, overlooking the Downs and the coast of France. When Mr. Todd purchased the land about a year ago there was on the site a small house, built with outside walls of a single brick in thickness, and cemented, but with a picturesque verandah. To this house it was only intended to build a wing. The wing was well advanced when it was decided to pull down the front of the house so as to get thicker walls and make the old elevation in keeping with the new. Eventually the whole was removed. The various changes somewhat governed the arrangements of the plan. The house is erected as shown on the drawing, excepting a slight change in the treatment of the dormer terminating the bay-window.

The principal story is raised some 6 ft. above the level of the ground, so as to take advantage of the sea views. This causes the basement story to be well out of the ground and thoroughly light.

The house is square on plan. It contains, in the basement, housekeeper's room, servants' hall, kitchen, pantries, larders, water-closets, &c. On the principal floor are five reception-rooms, butler's pantry, and bedroom. There are fifteen bed and dressing rooms, with ample bath-room and the necessary accommodation. The serving lobby of the dining-room is separated from the principal part of the house, and is supplied with a lift. The balcony-room is intended for billiards and smoking.

Especial care has been taken with the sanitary arrangements. Air is admitted into the halls, heated by Doulton's radiating stoves, and circulated through all the bed and sitting-rooms. The house is well fitted; there are water-closets and hot and cold water on each floor.

The verandah in the centre of the front o the house can be approached from either the drawing or dining rooms, and can in winter be glazed so as to give additional warmth to these rooms. The principal entrance of the house is through the glazed conservatory entrance at the side. This leads into a large central hall 31 ft. long by 13 ft. wide. The main staircase is enclosed within an arcading, and forms a picturesque feature.

The external walls are hollow, being faced with Teynham red bricks on the two lower stories. The timbering of the upper story is backed with brickwork one brick and a half in thickness; the timbers are painted a dark combed oak, and the panels filled with pebble dash, collected from the sea shore. The roof is boarded, felted, counter raftered, battened, and hung with Broseley tiles. The hip and valley tiles have been purposely made to range with the tile courses. The return angle tiles are also purposely made to overlap the fronts of the dormers, and thus prevent the wet penetrating between the timbers and the tiles. The whole of the basement is covered with a bed of concrete. No expense has been spared to make the house comfortable and weather-proof against the driving rains and east winds.

The building has been erected by day-work, excepting the following contracts:—Messrs. Taylor & Sons, of London, for the hot-water and bath apparatus; Mr. G. Harvey, for plastering; Mr. Bartlett, of Walmer, for plumbing; Messrs. Frost Brothers, of Deal, for gasfitting.

On the site of the trees shown on the drawing Mr. Tod is now erecting a large gabled house, which we may hereafter illustrate.

THE NEW PROVINCIAL ESTATES HOUSE, HANOVER.

ONE of the most striking new buildings of Hanover is the edifice which we illustrate in our present number, the house in which the estates of the province of Hanover meet. It was built in 1879 and 1880, from plans by the architect F. Wallbrecht. Its site is the crossing-point of the Schiffsgraben and the Sophienstrasse, in the axis of the latter, and forms for it a monumental *point de vue*. The building stands clear in the centre of garden grounds, and is of a rectangular form, 200 ft. long by 98 ft. deep, with projectures in the centres of the four façades. The edifice, of a light grey sandstone quarried at Nesselberg, near Springe (Hanover), Lauba brick being sparingly employed, is in the style of the Italian Renaissance. The ground-story is of freestone; the first story has broad windows framed by Doric columns and corresponding pediments; the second story forms an arcade gallery divided by pilasters. The centre portion of the principal front is adorned on the ground-floor by a wide carriage porch with balcony over it, and in the two upper stories by a large semicircular-headed window, flanked by columns and surmounted by an entablature and pediment. It is profusely decorated with figures in the spandrels over the semicircular-headed window, and with reliefs at the sides. The former, representing History and Poesy, were executed by the sculptors Narten and Dopmeyer, of Hanover. The relief to the left, by Professor Engelhardt, of Hanover, shows Trade and Agriculture under the protection of Hannovera; that to the right, by the sculptor Hartzer, of Berlin, Arts and Sciences under the ægis of Germania. The frieze is adorned with the arms of the seven counties (Landschaften) of Hanover,—Hildesheim, Bremen-Verden, Lüneburg, Kalenberg, Göttingen-Grubenhagen, Hoya-Diepenholz, Osnabrück-Ostfriesland.

The interior execution agrees with the exterior, the principal decoration being concentrated in the centre portion. From a vestibule, the groined vaulting of which is supported by columns of Swedish granite of a reddish colour, the walls being of yellowish stucco marble, the staircase with three flights is reached. The latter, which

reaches through the three stories, is lighted by a large skylight in painted glass, and closed by a surbased vault with ogives. Rich ornamentation, coats of arms, and frescoes adorn the staircase, which in the upper stories opens into arcade galleries, by which access is gained in the first floor to the lobby of the "house," in the second floor to the strangers' gallery. The principal meeting-room of the above-mentioned "house" has a height of 36 ft., is 58 ft. long, and 33 ft. broad, and has sitting-room for seventy-nine deputies, the marshal and the president of the province, and the councillors of the exchequer. The hall is lighted from above and from side windows placed high up; its walls are of a sober hue, but enlivened by the coats of arms of the counties and chief cities of the province of Hanover. The principal hall and the lobby are heated by hot air, and connected with a retiring-room for the chief officers of the house, and a cloak-room for the deputies. The rooms to the right and left of the principal hall include, in the first story, another smaller hall, committee-rooms, and official residences. In the second story are the library, committee-rooms, and offices.

The total cost of the building, including the price of the site and the expenses attaching to laying out the grounds, was 75,000*l*.

THE FUTURE OF LIGHTING AND HEATING.

FROM the admirably practical and perspicuous address delivered by Dr. C. W. Siemens, F.R.S., as President of the British Association for the Advancement of Science, and upon which we offered some comments last week (see p. 295, *ante*), we extract the following passages:—

The advantages of the electric light and of the distribution of power by electricity have lately been recognised by the British Government, who have just passed a Bill through Parliament to facilitate the establishment of electrical conductors in towns, subject to certain regulating clauses to protect the interests of the public and of local authorities. Assuming the cost of electric light to be practically the same as that of gas, the preference for one or other will in each application be decided upon grounds of relative convenience; but I venture to think that gas-lighting will hold its own as the poor man's friend. Gas is an institution of the utmost value to the artisan; it requires hardly any attention, is supplied upon regulated terms, and gives, with what should be a cheerful light, a genial warmth, which often saves the lighting of a fire. The time is, moreover, not far distant, I venture to think, when both rich and poor will largely resort to gas as the most convenient, the cleanest, and the cheapest of heating agents, and when raw coal will be seen only at the colliery or the gasworks. In all cases where the town to be supplied is within, say, thirty miles of the colliery, the gasworks may, with advantage, be planted at the mouth, or still better at the bottom, of the pit, whereby all haulage of fuel would be avoided, and the gas, in its ascent from the bottom of the colliery, would acquire an onward pressure sufficient probably to impel it to its destination. The possibility of transporting combustible gas through pipes for such a distance has been proved at Pittsburg, where natural gas from the oil district is used in large quantities. The *quasi* monopoly so long enjoyed by gas companies has had the inevitable effect of checking progress. The gas being supplied by meter, it has been seemingly to the advantage of the companies to give merely the prescribed illuminating power, and to discourage the invention of economical burners, in order that the consumption might reach a maximum. The application of gas for heating purposes has not been encouraged, and is still made difficult in consequence of the objectionable practice of reducing the pressure in the mains during daytime to the lowest possible point consistent with prevention of atmospheric indraught. The introduction of the electric light has convinced gas managers and directors that such a policy is no longer tenable, but must give way to one of technical progress; new processes for cheapening the production and increasing the purity and illuminating power of gas are being fully discussed before the Gas Institute; and improved burners, rivalling the electric light in brilliancy, greet our eyes as we pass along our principal thoroughfares. Regarding the importance of the gas supply as it exists at present, we find from a Government return that the capital invested in gasworks in England, other than those of local authorities, amounts to 30,000,000*l*.; in these, 4,281,048 tons of coal are converted annually, producing 43,000,000,000 cubic feet of gas, and about 2,800,000 tons of coke; whereas the total amount of coal annually converted in the United Kingdom may be estimated at 9,000,000 tons, and the by-products therefrom at 500,000 tons of tar, 1,000,000 tons of ammonia liquor, and 4,000,000 tons of coke, according to the returns kindly furnished me by the managers of many of the gasworks and corporations. To these may be added, say, 120,000 tons of sulphur, which up to the present time is a waste product. Previously to the year 1856,—that is to say, before Mr. W. H. Perkin had invented his practical process, based chiefly upon the theoretical investigations of Hoffman, regarding the coal-tar bases and the chemical constitution of indigo,—the value of coal-tar in London was scarcely a halfpenny a gallon, and in country places gas-makers were glad to give it away. Up to that time the coal-tar industry had consisted chiefly in separating the tar by distillation into naphtha, creosote, oils, and pitch. A few distillers, however, made small quantities of benzine, which had been first shown,—by Mansfield, in 1849,—to exist in coal-tar naphtha mixed with toluene, cumene, &c. The discovery, in 1856, of the mauve or aniline purple gave a great impetus to the coal-tar trade, inasmuch as it necessitated the separation of large quantities of benzine, or a mixture of benzine and toluene, from the naphtha. The trade was further increased by the discovery of the magenta or resaniline dye, which required the same products for its preparation. In the meantime carbolic acid was gradually introduced into commerce, chiefly as a disinfectant, but also for the production of colouring matter. The colour industry utilises even now practically all the benzine, a large proportion of the solvent naphtha, all the anthracene, and a portion of the naphthaline resulting from the distillation of coal tar; and the value of the colouring matter thus produced is estimated by Mr. Perkin at 3,350,000*l*. The demand for ammonia may be taken as unlimited, on account of its high agricultural value as a manure; and, considering the failing supply of guano and the growing necessity for stimulating the fertility of our soil, an increased production of ammonia may be regarded as a matter of national importance, for the supply of which we have to look almost exclusively to our gasworks. The present production of 1,000,000 tons of liquor yields 95,000 tons of sulphate of ammonia, which, taken at 20*l*. 10s. a ton, represents an annual value of 1,947,000*l*. The total annual value of the gasworks by-products may be estimated as follows: Colouring matter, 3,350,000*l*.; sulphate of ammonia, 1,947,000*l*.; pitch (325,000 tons), 365,000*l*.; creosote (25,000,000 gallons), 208,000*l*.; crude carbolic acid, (1,000,000 gallons), 100,000*l*.; gas coke, 4,000,000 tons (after allowing 2,000,000 tons consumption in working the retorts), at 12s., 2,400,000*l*.,—total, 8,370,000*l*. Taking the coal used, 9,000,000 tons, at 12s., equal 5,400,000*l*., it follows that the by-products exceed in value the coal used by very nearly 3,000,000*l*. In using raw coal for heating purposes these valuable products are not only absolutely lost to us, but in their stead we are favoured with those semi-gaseous by-products in the atmosphere too well known to the denizens of London and other large towns as smoke. Professor Roberts has calculated that the soot in the pall hanging over London on a winter's day amounts to fifty tons, and that the carbonic oxide, a poisonous compound, resulting from the imperfect combustion of coal, may be taken as at least five times that amount. Mr. Aitken has shown, moreover, in an interesting paper communicated to the Royal Society of Edinburgh last year, that the fine dust resulting from the imperfect combustion of coal is mainly instrumental in the formation of fog, each particle of solid matter attracting to itself aqueous vapour; these globules of fog are rendered particularly tenacious and disagreeable by the presence of tar vapour, another result of imperfect combustion of raw fuel, which might be turned to much better account at the dye-works. The hurtful influence of smoke upon public health, the great personal discomfort to which it gives rise, and the vast expense it indirectly causes through the destruction of our monuments, pictures, furniture, and apparel, are now being recognised, as is evinced by the success of recent Smoke Abatement Exhibitions. The most effectual remedy would result from a general recognition of the fact that wherever smoke is produced fuel is being consumed wastefully, and that all our calorific effects, from the largest furnace down to the domestic fire, can be realised as completely and more economically, without allowing any of the fuel employed to reach the atmosphere unburnt. This most desirable result may be effected by the use of gas for all heating purposes, with or without the addition of coke or anthracite.

THE NEW PUBLIC HALL, PRESTON.

THE new Public Hall at Preston, formerly known as the Corn Exchange, was opened on Monday last. The alteration and enlargement of the Corn Exchange, from the designs of Mr. B. Sykes, of Preston, will cost the Corporation between 10,000*l*. and 11,000*l*., which is more than was originally estimated to be the cost. The increase is owing to certain additional structural arrangements, which, as the work has progressed, were found to be absolutely necessary, if the idea originally entertained of making the building one of the largest and finest in the county was to be carried out. The aim has been to utilise to the utmost the space at disposal for the accommodation of the public, without in any way depreciating the effect of vastness and the unity of architectural design, and Mr. Sykes has (according to the *Preston Guardian*) succeeded in forming the interior into a lofty and imposing auditorium, commanding from every seat an unobstructed view of the orchestra. The new public hall exceeds the dimensions of the Free Trade Hall in Manchester. The measurement of the Free Trade Hall is 133 ft. by 77 ft., or 10,241 square feet; the Philharmonic measures 135 ft. by 102 ft., or 13,770 square feet; and the dimensions of the new Public Hall in Preston are 147 ft. by 95 ft., or 13,965 square feet. Applying the standard regulating the total capacity of the Free Trade Hall and other large buildings of a 1 ft. 6 in. and 1 ft. 9 in. sitting accommodation for each person, the Public Hall will hold 3,564 persons, accommodation being distributed as follows:—Front seats, 524; back seats and under galleries, 1,433; galleries, 807; standing-room being left for 800 persons. The orchestra, which is not included in this calculation, is constructed to hold 250 performers. The main entrance to the hall is from Lune-street, through a tiled vestibule, with a glazed screen. A large crush-room is then entered, to which are attached retiring-rooms for ladies and gentlemen. Passing through a vestibule containing stairs, the floor is reached, which measures 145 ft. by 95 ft., including that portion occupied by the orchestra. The floor is constructed of pitch-pine. The orchestra, which is situated at the other end of the building, in front of the main entrance, is approached from the front on each side by staircases for the band, and from the rear by two doorways for the chorus. The seats, eight rows in depth, are arranged in a semicircular form and in tiers, the front seats for the band being on a level plane. All the steps are movable, so that a clear stage can at any time be presented when the hall is used for public meetings or theatrical performances. In the centre at the rear is the organ, which occupies a chamber measuring 24 ft. by 20 ft. There is a handsome proscenium flanked by bold pillars, with ornamental caps and entablature. The gallery is surmounted by eighteen arches, nine on each side, each having a span from pillar to pillar of 14 ft. It is supported by iron columns and strong pilasters against the walls, which relieve the old walls of the entire weight of the structure. The keystones of the arches are ornamental, with carved blocks and spandrels, and curved ribs in the cove, enriched with ornamental work, and Classic in design. The broad gallery runs round three sides of the building, and has two entrances at the north and two at the south side, and from every seat a good view of the orchestra can be obtained. Beneath the gallery there is a mezzanine floor, and on each side of the gallery there are corridors 7 ft. wide, which connect the assembly-room with the retiring-rooms and waiting-rooms behind the orchestra. Connected with these places there is a large supper-room, measuring 42 ft. by 36 ft., and which communicates with a kitchen in the basement by means of a lift. There is also in the

basement storage room for the hall seats, cooking accommodation, and all the necessary appliances. A pitch-pine staircase has been constructed, in order that there may be direct communication between the floor of the area and the supper room. The height of the building from floor to ceiling is 45 ft. The method of lighting and ventilation is admirable. A series of circular windows of ribbed, reflecting glass, specially made for the purpose, have been fitted into the ceiling. The ceiling is dome shaped, with good wall space. For ventilation, three of Strode's ventilators, 4 ft. 6 in. in diameter, and six, 3 ft. 6 in. in diameter, have been fitted up. The heating arrangements have been carried out by Messrs. Metcalf & Dilworth, hot-water engineers, of Preston. The building can be illuminated by means of three large sunlights, with 127 jets in each. The hall has a very light and cheerful appearance, the decorations being in a quiet key, and in harmony with the ceiling, the plaster work of which is white through its whole extent. The pillars are painted in light drab, and the caps relieved with gold. The front of the gallery and the cornice is coloured in greens and chocolates of various tones, which harmonise with the general light scheme of colour pervading the upper portion of the building, and it is only underneath the gallery, on the bases of the pillars, that darker tints are used. The walls underneath the gallery, and of the retiring-rooms, have a dado 4 ft. high, of a chocolate colour, with ornamental border, the other portions being of a creamy tint. The whole of the works have been undertaken by Mr. Robt. Saul, builder, of Preston. The furnishing of the hall and the whole of the interior were entrusted to Messrs. Bell & Coupland.

MEETING OF THE INTERNATIONAL SANITARY CONGRESS, GENEVA.

THE few delegates who, in prudence, came to Geneva a little before date, will have found the time hang heavily on their hands. The principal secretary, Dr. P. L. Dunant, has displayed unceasing activity, and, if he escapes the strain without serious consequences, it will speak well for the vigour of his constitution; but other secretaries, without whose assistance the work became almost impossible, ominously fell ill at the last moment. None of the offices for the congress were, therefore, opened before the 3rd September; that is, on the eve of the commencement of the congress. Further, the Sanitary Exhibition, which should have been ready to receive the public on the 1st of September, remains closed, and admission cannot be obtained before the 4th, and even then the exhibits will be found still in a very confused condition. The organisers of the congress are, however, in no wise to blame for this *contretemps*. The building was not given up to them by the authorities till a fortnight after the date promised. In spite of these little drawbacks,—which, indeed, are characteristic of nearly all congresses,—the meeting promises to be a great success. Names and subscriptions have already been received from no less than 400 adherents, and most of the Governments of Europe have sent special delegates. We have already met Dr. H. Napia and M. Durand Claye, delegates of the Paris Municipal Council; Dr. Louis de Csatary, delegate of the Hungarian Government; and Señors Cabello, Montejo, and Vilanueva, delegates of the Spanish Sanitary Society, and the Ministries of War, Marine, and Interior; Dr. Hausser, from the Municipality of Seville; and Dr. da Silva-Amado, from Portugal. These sanitary reformers from the Peninsula for the most part frequent the Hôtel Métropol, the largest hotel of Geneva, and its vast drawing-rooms, staircases studded with divans, supply facilities for lounging and talking highly appreciated by the members of the congress, who have each a special scheme to discuss or system to propagate.

Armed with a special permission, we penetrated the sanitary exhibition, and, clambering over packing-cases, gained a fair view of the display. Practically, it bears the character of a French exhibition, and, being French, it is essentially Parisian. The City of Paris is so far the principal exhibitor that it has printed and issued a special catalogue of its own, independently of the general catalogue. Certainly such a measure is of service, and, to those who are not yet familar with Parisian administrative matters, this section will prove of very great interest; while every one will be pleased to note how elegantly, even artistically, are arranged objects that might be considered anything but attractive. Thus there is a trophy of all the brooms, scrapers, spades, &c., used to clean the streets and sewers of Paris, which is so well grouped that it looks absolutely ornamental. Close at hand are all the instruments used at the Observatory at Montsouris for the analysis of the air of Paris. Splendid drawings describe the water supply of Paris, the aqueducts of the Vanne, the Dhuis, and the Canal de l'Ourcq; every system of tap and hydrant; and, finally, a full-size model of a section of a house, showing how the water is distributed and the mysteries of the plumber's work. Under the sink, the pipe is straight; there is no trap or syphon; and this, as a representation of what is done in Paris, is correct enough. But, outside the house, a disconnexion is established by allowing the 1-in. lead pipe to flow into the mouth of a 4-in. junction to the rain-water spout. Unfortunately, this is so far from being the general practice in Paris that, though we have visited many houses, we do not remember one instance where any such disconnexion was attempted.

Warming and ventilation as practised in Paris are admirably represented by models and drawings of the Hôtel Dieu, the new Hôtel de Ville, where Messrs. Geneste & Herscher's system of ventilation has been adopted, and of various other hospitals, public buildings, &c. Sections of all the Paris sewers, models of the *tinettes filtres*, for retaining solid matter while the liquid is allowed to go to the sewer, are shown, together with the entire plans of the irrigation farm at Gennevilliers. Under the latter are specimens of gigantic vegetables grown by the aid of the Paris sewage. But all English observers, possessing even only a slight technical knowledge of such subjects, will be surprised, not to say scandalised, by a huge double picture illustrating the disadvantages of cesspools as compared to sewers. The first half of the picture represents, in a very graphic and telling manner, the interior of a house while a cesspool is being emptied. From the garret to the people walking in the streets every one is seeking to escape from the foul odour. Certainly this rendering of a domestic inconvenience which all Parisians have experienced is familiar and effective. The second half represents the same persons, in the same house, quietly enjoying the evening without experiencing any inconvenience. It also shows that the cesspool has been abolished, and the closets, &c., placed in direct connexion with the sewer. As a means of popularising a generally approved principle, this picture might have been of service; but, as it stands, it is, on the contrary, a triumphant demonstration of the superiority of cesspools over sewers in a country where such profound ignorance of house-drainage still prevails. According to the model in question, instead of improving matters, sewer gas has been laid on throughout the house. It will scarcely be credited that there is not a single precaution taken to prevent the entrance into the house of gas from the public sewer. The drain-pipe ceases under the seat of the highest closet; it is not carried up to the roof for ventilation. It communicates by junctions with all the other closets on each floor, and none of these closets have any traps. It is only when the pipe, passing underneath the house, approaches the public sewer that a bend will be found; but no means whatsoever are shown of ventilating the pipe, or of ventilating the public sewer into which the pipe falls. The house is thus utterly unprotected, and under such circumstances the old cesspool, with all its inconveniences, would be far preferable. It is astonishing that the municipality of Paris should have allowed this drawing, replete with every imperfection, to be presented as a model, and on such an occasion!

Among the private exhibits will be noted some very beautiful drawings of M. Émile Trélat's system of unilateral light for school-rooms, &c., which, at one glance, explain his system. These clearly show how windows can be managed so as to let the light come all from the same direction, thus avoiding the cross lights which distract and distress the eyes, and yet having equal and sufficient illuminating power over each desk or seat. On the opposite side M. Trélat also places windows, but these are shut during class time by venetians or wooden shutters, which, while admitting air, exclude light; thus the "unilateral" light is maintained. When once, however, the lessons are over and the class-room vacated then the shutters are removed and the light admitted from both sides, but this only for the purpose of purification, for the purpose of giving the schoolroom a bath of sun, air, and light.

Some drawings explanatory of the Geneva system of drainage will surprise many English critics. Geneva admits the principle of draining into the sewer, but it still maintains its old cesspools. These, however, are placed in direct communication with the sewer, and to prevent the nuisance of emptying the cesspools or the danger of accumulations, water is turned on at great pressure by means of stop-cocks accessible in the street, and the cesspools are thus periodically flushed. The violent inrush of the water stirs up the heavy matter, and it flows away into the sewer which has its outfall into the Rhone at a point some distance below the town. It is difficult to understand why the cesspools should have been maintained, when once it was determined to admit all matter into the sewer. Also the cost of carrying a pipe across the cesspool to the sewer would have not amounted to the sum now expended in periodical flushing of the cesspools. The dangers that may arise from bringing the water-pipes into the cesspools might also be avoided. In any case, if the inhabitants of Geneva are so tenacious for the preservation of their antiquated cesspools, we would respectfully suggest that these should in future be utilised as intercepting chambers for the purpose of ventilation and of breaking the connexion between the house and the sewer.

Such are a few among the more striking features of the Sanitary Exhibition. There are, of course, numerous health charts, statistical reports of all description, ambulance displays, patent foods, school furniture, chairs for invalids, &c., and, doubtless, many new inventions will be on view in a few days, when the preparations are all complete.

We have every promise of a busy week. Apart from the meetings of the five sections every morning, and the general meetings in the afternoon, every evening is also taken up. On Monday evening an official reception will be held. Tuesday evening Professor A. de Candolle receives the members at his country mansion of the Vallon. On Wednesday there is a similar reception at the hydrotherapic establishment of Champel-sur-Arve; while on Thursday the Swiss Government places the steamer *Mont Blanc* at the disposal of the congress. The water-cure establishment of Evian will be visited, and lunch taken at the establishment; then the steamer, crossing the lake, will take the members of the congress to a banquet offered them by the municipality of Montreux at the Kursaal. On Friday there is a reception at the mansion of Madame Eynard, and finally there is a farewell banquet on Saturday.

In spite of all these attractions, we are sorry to note, in conclusion, that the number of English members present is still very limited.

THE CIRCULATION OF UNDERGROUND WATERS.

IN the Geological Section of the British Association meeting at Southampton,

Mr. C. E. De Rance read the report of a committee appointed for the purpose of investigating the circulation of the underground waters in the permeable formations of England, and the quality and quantity of the water supplied to various towns and districts from those formations, to which was added an appendix, written by Mr. Edward Wethered, on the density and porosity of rocks in relation to the water supply, in which the author set out by averring that a knowledge of the porosity of rocks was important as regarded the water supply, the suitability of stone for building purposes, and in accounting for some of the lithological changes often observed in the earth's strata. Though the matter had not escaped investigation, the vast volume of water stored in the rocks had not been fully realised. The density of the old red sandstone was 2·61, the volume of water absorbed by a cubic foot being over 0·707 gallon, and by a square mile, 3 ft. thick, 59,000,000 gallons. The conglomerate beds of the same formation were still more absorbent, being capable of taking in 0·805 per cubic foot, or 67,000,000 gallons to

a square mile, 3 ft. thick. The mill-stone grit which lay at the base of the coal measures varied much in different localities, that found in the Forest of Dean being the most porous, absorbing 66,000,000 gallons to the square mile, 3 ft. thick. Some of the coal-measure grits also stored large volumes of water. The Pennant rock, about 900 ft. thick, in the Bristol coalfield, and extensively developed in Somersetshire, as also around Swansea, was capable of absorbing 12,000,000 gallons in a square mile, 3 ft. thick; and specimens of magnesian limestone taken from the neighbourhood of Bristol, showed a porosity of 86,000,000 gallons, but the carboniferous limestone was quite the reverse, and only absorbed 3,500,000 gallons. Oolites held vast stores of water, and the rock was much used for building. Mr. Wethered then referred to the relation of specific gravity to porosity, and proceeded to say that shallow well-water had been classed by the Rivers Pollution Commissioners as dangerous, and the deep as wholesome, and there must, therefore, be a purifying process going on during the percolation into the earth. From an analysis of rocks, it was clear that nothing in the chemical composition of the rock could purify the water, and in order to get rid of organic contamination there must be oxidation, and they must, therefore, look to another source for the oxidising agent, which, he thought, existed in the air absorbed by the water, and in the air contained in the interstices of the rock.

DISCOLORATION OF "SOUTHAMPTON WATER":

IS IT DUE TO SEWAGE?

IN the Section devoted to Biology (Department of Zoology and Botany), British Association meeting, Southampton,

Mr. Arthur Angell, F.I.C., the County Analyst, read a paper on the brown coloration of "Southampton Water." The writer showed that the peculiar colour of the Southampton estuarine water, which turns to a rusty brown tint in the summer of each year, is due solely to the presence of a small ciliated organism, *Peredinium fuscum*, which is classified by the best authorities amongst the ciliated protozoa, or microscopic animals. This position is generally accepted, but Mr. Angell, seeing that they evolve oxygen, contain chlorophyll, — plant colour matter,—have no mouth or opening of any kind, never contain foreign bodies, have cellulose walls, and, after death, give off an odour of decaying seaweed, is of opinion that they are more plants than animals. He further sought to show that their presence is due to the large amount of sewage thrown into the river at and about Southampton. The seaward margin of the river water is distinctly mapped out by the brown colour, and the author noticed that this never leaves the estuarine basin, and pointed out that a measurement of the oscillations of this line provides a true index of the tidal motions, and shows that the water in the river is but very slowly, if at all, changed by the rise and fall of the tides. He showed it was an error to suppose that in tidal rivers and land-locked estuaries a fresh supply of water is given at every tide, and that as a matter of fact the time needed in which a single change in such waters as Southampton Water will take place is dependent more upon the small flow of fresh water and surface evaporation than upon tidal influences. It is not, therefore, safe to pollute tidal waters with sewage; the impression that the filth goes out to sea with the tide is utterly false. The peculiar brown colour gives us an indication by which we can learn that practically a change of the water of the Southampton Water, and therefore of all other similarly situated tidal-river mouths and land-locked estuarine basins, is but very slowly, if ever, effected by the tides. Enough filth is poured into the river to make it in hot weather a stinking abomination, but in accordance with nature's provisions against such unnatural proceedings, a vast army of minute organisms is set to work and the water is kept tolerably sweet. If it can be shown that this creature, which is barely visible to the naked eye, performs the chief functions of plants,—liberates oxygen, and is at the same time an animal and therefore carries on direct nitrification, it is indeed most wonderfully adapted, by this double set of powers, to keep our sewage-polluted waters as sweet as is possible. Notwithstanding the unsightly colour of *Peredinium fuscum*, we cannot afford to do without it in our river. When the day comes that the authorities of Southampton see fit to keep out the sewage now flowing into its waters so as to free them from such vile pollution, the *Peredinium fuscum*, no longer needed in such vast quantities, will retire into its normal position, become less obtrusive, and leave the water a pure translucent green.

The paper was illustrated by three views showing the enlarged representations of the organism, Mr. Angell adding there was a most wonderful likeness in all the specimens. He had seen them in the Southampton Water in countless millions for years, and had never seen the slightest difference in them, nor had he known an instance of self-division or conjugation, and was perfectly in the dark as to whence the organism comes and whither it goes.

Professor Lawson, M.A. (president of the Department) said the colour of the water which Mr. Angell had described he at first imagined was due to innumerable diatomaceæ of a certain kind which they all knew were exceedingly abundant in estuarial waters; in fact, it was where fresh water and salt water met that it was most abundant. The *Peredinium fuscum* was a creature which, of course, was thoroughly well known, and it made its appearance in large quantities, and he thought it was to that, to a large extent, though not entirely, that the discoloration of the water might be due.

Mr. Shore, jun., said he was sure the members were obliged to Mr. Angell for his interesting paper. As to the nature of the organism, that should be left an open question to be worked out during the resting stage, and when the process of conjugation and division had been watched.

Mr. Angell said the difference of opinion which had been alluded to as to the exact nature of the organism was likely to exist for some considerable time, but he thought they were drifting into circumstances when all would have to admit that no hard and fast line could be drawn between a plant organism and an animal organism. These organisms, however, seemed to him to indicate a remarkable instance of the adaptability of Nature to circumstances, the organism being marvellously well adapted for the double purpose it had to perform. He had a bottle of water taken that morning, but it was not a good specimen of the discoloration; for westerly winds such as were then being experienced affected the colour, but in calm quiet days, the water was quite as thick as good hot brown coffee.

THE VYRNWY (LIVERPOOL) WATER SCHEME.

THE report of Mr. G. F. Deacon, Water Engineer to the Corporation of Liverpool, on the progress of the Vyrnwy works up to the 30th of June last, has just been issued. Mr. Deacon states that the embankment about to be constructed across the valley of the Vyrnwy will impound the upper waters of that river, and will form, for the supply of Liverpool, a lake at an elevation of 825 ft. above the sea level, having an area of 1,115 acres. The length of the embankment from rock to rock at the water level will be about 1,255 ft.; its height above the original river-bed to the ordinary top water level about 84 ft., and to the parapet wall of the roadway to be carried on arches along the embankment about 98 ft. It will be formed of rubble masonry set in Portland cement mortar, and will be founded wholly upon sound rock of the Caradoc beds in the lower silurian formation. This rock extends across the valley and up both sides thereof. The greatest depth of its surface below the river bed, within the area to be built upon, is about 55 ft. Before the works were commenced the rock in that part of the valley across which the masonry embankment is to be constructed, was covered with glacial drift, containing boulders of five or six tons weight, and blocks of rock of forty or fifty tons dislodged by glacial action. Above this drift lay an alluvial deposit, the result of silting up by the rock *débris* and *detritus* brought down by the many streams which feed the present river. In times of heavy rain the river Vyrnwy flooded the whole width of the valley, at the site of the intended embankment. Before commencing the present excavations the river was diverted from the left bank of the valley, where the rock is at a considerable depth below the surface, to the right bank, where it is close to the surface, and the new channel was made of sufficient capacity to pass the highest floods. This work had been completed when the memorial-stone was laid on the 14th of July of last year. Since that time the excavation to the rock has proceeded rapidly. The building of the masonry embankment will be commenced on the rock foundation to the north of the diverted river. The stone for this purpose is being obtained by quarrying at a point in the Cynon Valley about a mile and a quarter distant from the site of the embankment. The rock is of the same nature as that forming the foundation, and the dip of the strata is such that the stone may be obtained at very moderate cost. A tunnel is being constructed from the intended lake to the Hirnant Valley. It will form the first part of the aqueduct. Its length will be two miles 473 yards, and it will be of sufficient size to pass the whole of the water of the three instalments of 13,000,000 gallons a day each.

CEMENT, "VULCAN," AND ASPHALTE FLOORS.

A RECENT issue of the *Baugewerkszeitung* contains a communication by Herr Walter Lange on some results obtained by him in the use of cement, a material called "Vulcan," and asphalte for floors in wet and highly-heated rooms. In the extensive rebuilding of the starch manufactory of Herr E. Hoffmann at Salzuflen (near Minden), burnt down some time ago, about 30,000 square yards of flooring had to be laid down. The various uses to which those floors would be put necessitated the employment of various materials. If to this fact it be added that a portion of the floors had to be taken into use as soon as ever practicable, it may well be believed that it was not a very easy matter to make a selection at once as to the proper material to be employed. Experiments had on former occasions been made with different materials, all of which had been unsuccessful. It was especially found that the wear and tear of the floors in the starch factory was very great, owing to the employment of three-wheeled trollies (on the average loaded with 20 cwt. to 30 cwt.), the rapid deterioration of the floors being further accelerated by the fact that they are generally in a very wet or highly heated state.

It was at first intended to use a layer of cement on a concrete bottom for all the rooms (stone slabs could not be employed for the greater part of the rooms on account of the joints), and this was partly laid down when it was found that it would not answer. As above stated, sufficient time had not been allowed for hardening, and then the floors were used at once to such an extent that the cement was broken up in an incredibly short time by the three-wheeled trollies. The front wheel, in turning, leans over on one side, and cuts the upper skin of the cement; and if this was once effected, there was no chance of saving the rest, for the lower layer had not yet attained that hardness which would resist pressure. Water on the cut and bruised surface completed the destruction, for, being forced on to the floors at high pressure, even pebbles in the floor were washed out.

Two methods were employed at Salzuflen for laying down cement floors. Upon a fresh bed of concrete, a layer consisting of cement and sand in equal parts, and from 2 to 3 centimètres thick, was put, well rammed down, levelled, and then smoothed with a hand iron. This proceeding, compared with the other, has several disadvantages. The second method consists of mixing a concrete of one part of cement, two parts of sand, and four parts of gravel, laying it down, and ramming it until a layer from 1 to 2 centimètres thick appears on the surface without any gravel. This layer is then levelled and smoothed down. Floors prepared by the latter method are much more durable, and resist pressure much better than those laid down by the former. The thickness of the concrete floors depends very much upon the extent to which they will be used, and the resistance of the soil to be covered. If sufficient time is left for the cement floor to harden,—and the longer it is left the better,—it will resist for a very long time any ordinary pressure.

In the drying-rooms of the above starch manufactory, cement floors were also laid down;

but they proved efficient only after having been put down in first-rate style, and left to bind and harden for a sufficient length of time (from four to six weeks). But should they be intended to be used before that time, and subjected early to a high temperature (about 40° C.), it is highly advisable to desist from using cement. In the latter case, a kind of floor is to be recommended which is at present very little known, and is described by the inventor, Herr Oelzner, Ingenieur, of Hagen, Westphalia, as "Vulcan" floor. The mass is poured upon prepared beds to a thickness of 4 centimètres to 6 centimètres, and costs from 3 marks to 3½ marks per square mètre (about 4d. a square foot). The "Vulcan" floors are prepared in the following manner. The surface is covered with stone chips, ashes, &c., the height of this bed depending upon their later use. The mass, the composition of which is Herr Oelzner's secret, is made liquid, and poured upon the bed. The liquid mass penetrates the cracks and pores of the rubble, and forms, after solidifying, a hard slab. After having somewhat settled, the mass is beaten with a wooden pestle, and smoothed. This operation is repeated as long as the floor sweats after each beating. The floor is smoothed down after each beating. Amongst the advantages claimed for the "Vulcan" floor is its great solidity, which it assumes, however, only after some time. But the hardening of the floor takes place even at a great heat (in the drying-rooms at Salzuflen, hardening is effected at a continuous temperature of 50° C.). Finally, it must be noted that the floor is proof even against strong acids. Experiments have been made by Herr Lange in which the mass in a powdered state was submitted to the action of concentrated sulphuric acid; the only effect of which treatment was that the mass dissolved and then hardened. Herr Lange likewise observed that old pieces of this floor, after having been immersed for some time in concentrated soda lye, remained perfectly intact. The only drawback is that hardening takes place so very slowly. On the other hand, the mass becomes so hard as even to blunt steel chisels very rapidly. Herr Oelzner's "Vulcan" floors have been very successful elsewhere, even in establishments where very heavy iron castings or forgings are moved over them. Herr Lange says respecting the composition of Oelzner's "Vulcan" mass it appears to him that it contains a large proportion of blast-furnace slag, and that residuums of sulphuric acid manufacture and the so-called *caput mortuum* (colcothar) are also used in it.

For such rooms as were already in use, it was found necessary to resort to asphalte. The asphalte, from the Limmer pits, was so-called casting asphalte (*asphalte coulé*). It was melted in the usual way, mixed with gravel, laid on, and smoothed down with wooden spattles. Concrete of cement, sand, and gravel served as a bed. In some rooms cement and asphalte layers were used together, asphalte being put down in the passages, concrete in the less used parts; a very sharp edge being indispensable for the joints. Of course, asphalte was employed in rooms with wet floors; but it is not suitable in rooms where acids are used, because asphalte peels off in course of time under the influence of acids.

It may be finally added that in Oelzner's starch manufactory several tanks had to be constructed for the reception of acids, the selection of the inner coating causing some difficulties. Cement, if exposed to the direct action of acids, is at once destroyed; asphalte shares the same fate, although not quite so rapidly. It was, therefore, proposed to employ a plaster of cement with a coating of zeïdeïolithe, a material consisting of nearly equal parts of sulphur and powdered glass and a trifling addition of graphite. This composition is absolutely acid-proof, but inflammable. Its preparation, moreover, and the laying-on, caused so many difficulties that the use of zeïdeïolithe was given up at the last hour. It was determined to employ stone slabs, filling up the joints with sulphur, a treatment or procedure which has been found efficient in sulphuric acid manufactories. Of course, it is understood that the stone slabs used must be acid-proof, and have been tested in that direction.

The Town Council of Oldham has passed a resolution in favour of the construction of the proposed ship-canal between Manchester and Liverpool.

THE NETHERFIELD GYPSUM WORKS.

MANY of our readers will remember that when certain scientific diggings were being carried on in East Sussex, between 1872 and 1877, although the undertakers missed a coal-mine they fell upon a mass of pure white crystalline gypsum,—alabaster. A company was formed, and has been at work for some time. An interesting account of the present condition of the works has been given recently by the *Sussex Advertiser*, and many of our readers will be glad to read a portion of it:—

The situation of the Subwealden Gypsum Works is remarkable for natural beauty. The mine is situated in a valley green with forest-wood, in the midst of the mountain district bounding the "the Garden of England." Battle, with its interesting old abbey, is only a few miles distant. The Ashburnham woods are close at hand. Normanhurst, with its spire-crowned walls, towers conspicuously on an eminence in the vicinity. In the wide green forest, rich with a natural flora, the visitor might fancy himself far removed from the habitations of men. Wild strawberries tempt his lips every few steps, wild foxglove blossoms around in rare exuberance. Were it not for the railway-siding and a tramway (1½ mile long) threading its way through the underwood of ash, oak, and chestnut, to effect a communication with the South Eastern main line, the poetry of the "greenwood tree" would be unbroken. Historically and archæologically the spot is not without interest. The railings of St. Paul's, lately removed, were cast in the neighbourhood. The last cannon made of Sussex iron was likewise cast only a few miles off; and, in 1863, a most interesting find was discovered in a field close by, consisting of solid gold ornaments, which must have belonged to a king or Druid of the Celtic period. The ignorant finder sold the invaluable relic for the paltry sum of 6s. 6d., taking it for brass, and the purchaser was Vandal enough to consign it to the melting-pot, for which,—having defrauded the Crown of its dues,—he was deservedly punished.

A chimney rising high above the trees indicates the site of the gypsum works, and serves as a land-mark around. The works are situated directly over the mine from which the raw material is extracted. The seam now worked is of comparative thickness, and lies some 160 ft. or 170 ft. under the surface. One of the three stationary engines,—of collectively about 130 horse-power,—raises the cage, the descent of which is regulated by a brake. A visit to the subterranean regions is rendered comparatively easy. There is little water to contend with, and the headings may be traversed dryshod. The gypsum occurs in places in beautiful crystalline forms. The headings are high enough for a tall man to pass along without much inconvenience. At the present depth four headings are being worked. But the shaft has been sunk lower down, and there are headings ready for working in the lower seam. The rock has, of course, to be blasted with gunpowder. To drill the holes Mr. Finlay, whose practical genius is everywhere apparent, uses augers of considerable length, wound in a spiral twist throughout. These augers, worked by hand, are so contrived as to stop automatically when striking upon a hard stone. In the gypsum they will drive 5 ft. in half an hour or less. But for an occasional whiff of gunpowder, the air below is pure. When blasted, the rock is broken up with pick and wedge, and conveyed in trollies to the shaft. The trollies are raised in a cage to about 20 ft. above the surface, stopped on a platform and made to slide down an inclined plane, on rails, to the place where the mineral is sorted and picked. Every piece is examined before use, and, if necessary, any admixture of clay is removed with a hammer. The principal uses to which gypsum is put are conversion into plaster of Paris and cement. The less pure stone is burnt, to serve as a valued manure. Gypsum blocks are also sold in their natural state to brewers, who dissolve them in the water about to be converted into beer. For brewing purposes no ingredient is more valuable than gypsum, to which mineral the Burton water stands indebted for its world-renowned excellent qualities. Fine pieces of gypsum are also sometimes polished as marble for use indoors. Out of doors gypsum is not serviceable, as being soluble in water. Moreover, it may interest smokers to learn that gypsum is frequently used for a very fair imitation of meerschaum. Indeed, all the cheaper meerschaum pipes and cigar-holders are reported to be made of this adulterated article, which is prepared by polishing hardened plaster, tinting it with a solution of gamboge and dragon's blood, and treating it afterwards with melted paraffin or stearic acid. This process is, however, not practised at Netherfield.

The blocks intended to be made into plaster, having been examined and sorted, are broken up by machinery and then placed in the kilns. There are five kilns for this purpose at Netherfield. The flame is not allowed to touch the mineral, but is carried up to the chimney in flues. The object aimed at is simply the evaporation of the water of combination. The crude gypsum contains about 25 per cent. of water. By desiccation this is reduced to 7½ per cent. Evaporation begins at 175 degrees, and is best effected at a temperature of 230 or 250 degrees. Overheating, say up to 480 degrees or more, spoils the gypsum by making rehydration difficult or altogether impracticable. The kilns at Netherfield hold 10 tons or 12 tons each. Twenty-four or twenty-six hours suffice for drying one kilnful. Being desiccated, the pieces are taken out and tested if sufficiently dried. If they are not, they are put into the kiln a second time. After drying, the gypsum is ground on horizontal stones, having first been "cracked." After that it is sifted, which is really the principal operation in the whole process. All depends upon this. The Sub-Wealden Company have an excellent apparatus for sifting, the construction of which is, however, a trade secret. When sifted the plaster is filled into bags, and stored to cool for ten or twelve days, and then it is ready for use. Plaster, we may mention, is often "hardened" by an admixture of carbonate of lime or gum-arabic, which makes it capable of taking, under further treatment of smoothing and polishing with oil, a marble-like surface.

Gypsum intended for cement,—to be used for internal plaster-work in houses, cornice-mouldings, and the like,—has to be burnt by direct contact with the fire. There are different kinds of cement, three of which are manufactured at Netherfield,—namely, Keene's, Parian, and Martin's. The original manipulation of the blocks is the same in all cases. Keene's cement is made by treating the burnt gypsum with one part of alum to twelve parts of water, at a temperature of about 95 degrees. Having stood three hours, the material is rebaked in the furnace, and then thoroughly ground and powdered. When so treated it requires less water, sets more slowly, and acquires a tenacity half as great again as that of ordinary cement. Parian cement is ordinary plaster hardened with water, containing 10 per cent. of borax, and afterwards rebaked and ground. Stucco is plaster prepared with a strong solution of glue. The blocks intended for cement, of whatever kind, are burnt to red-heat in a kiln set apart for the purpose,—which takes about thirty-four hours,—and afterwards ground and sifted the same as plaster-gypsum.

Netherfield gypsum picked for plaster or cement has, as a rule, a proportion of about 95 per cent. of the pure sulphate. Its advantage, as compared with other English cement, is its freedom from marl and iron, and accordingly from the unsightly red colour caused by these impurities.

A HINT TO HASTINGS.

THE urgent want in Hastings (among other wants) of a small fishery pier and shelter harbour, to which we directed attention recently, was forcibly illustrated during the heavy gale of last week, which passed over Hastings and St. Leonard's, doing damage to the extent of between 2,000*l.* and 3,000*l.* to the fishermen's quarters. The roadway is almost completely destroyed, and several boat-houses along the beach roadway washed away. Large quantities of nets and gear have been lost, but, fortunately for the poor fishermen, their boats have escaped. The cost, however, of replacing what has been lost will amount to a large sum, and it often spells bankruptcy to a poor boat-owner, and enforces idleness on many of the men assisting in working the fishing craft. Surely, after the present warning, the Hastings authorities ought to bestir themselves in constructing a permanent and efficient roadway along under the East Cliff, and providing a small harbour and pier for the fishermen. We would also again remind

the magnates of Hastings that a better system of groyne work and embanking is needed than what has been hitherto adopted. The life and death interest of the dwellers in, and the bread-winners of, the old town should not be so often and so systematically subordinated to the importunate and ever-administered-to calls of the fashionable new town. As towns and cities grow from their foundations, they have ever afterwards to be more or less dependent upon them. As it is with towns and houses, so it is with men. What revulsion of feeling is caused by seeing men and women richly attired, or with showy head-dress, while their feet below are ill shod. If Hastings does not wish to cultivate this analogy, and present a glaring exhibition of it, she had better bestir herself at once by manifesting an earnest activity in providing for the wants of the inhabitants of the older quarters of the historic Cinque Port.

THE GUILD-MERCHANT PROCESSIONS AT PRESTON.

REPRESENTATIVES OF THE BUILDING TRADES.

MONDAY last being "the Monday next after the Feast of the Decollation of St. John the Baptist," the week's celebration of the ancient Guild Merchant festivities was commenced at Preston. It is believed that the custom of holding the Guild Merchant dates back to early Saxon periods, but the first recorded Preston Guild was held in 1329, when Aubert, son of Robert, was mayor. Twenty-three guilds are recorded as having been held since then, and for the past 380 years they have been celebrated regularly every twenty years with quaint ceremony and great festivities. Although successive changes in the forms of local government have deprived the freemen of their ancient privileges, or, rather, removed the necessity for them, the Guild Merchant of to-day, while chiefly a round of festivities, has some features in common with those of centuries ago. It is still a means of bringing together members of the various trades, though not exactly for protective purposes, as was the case in days of old. Since the Guild Merchant began to change its character it has been a notable fact that each succeeding guild has surpassed its predecessors in magnitude of celebration. So it has been with that of 1882, which will turn out to be the most resplendent of all, largely on account of the anticipated though unfortunately abandoned visit of H.R.H. the Duke of Albany to lay the foundation-stone of the Harris Free Library. Triumphal arches span the principal thoroughfares, and many of them bear inscriptions welcoming the Duke and Duchess of Albany,—an incongruity which could not be avoided under the circumstances. In addition to these decorations most places of business are decked with bunting, and the old-fashioned aristocratic town presents a gay and festive appearance. Messrs. J. Defries & Sons, of Houndsditch, were entrusted with the decorations of some of the leading thoroughfares. The streets were lined with Venetian masts, on which were displayed trophies and festoons of flags.

The Amalgamated Trades' procession which paraded the principal streets of "Proud Preston" on Wednesday last included the following representatives of the building trades:—

Stonemasons.—Banner of the society from Manchester. Number in procession, 250, wearing wash-leather aprons trimmed with blue silk. Exhibits:—Lurry 1, flower-vases, finished and unfinished; lurry 2, building-stone in process of dressing, and dressed; lurry 3, the operation of stone-laying.

Ironfounders and Range-makers.—Two lurries, exhibited by Mr. Booth, Derby-street. On one, marble masons and marble polishers were at work; and on the other, range-founders and black and white smiths.

Plumbers and Painters.—The men, numbering 350, wore aprons emblazoned with their trade coat of arms. Exhibits:—Several lurries, one illustrating the plumbing department, containing a model of the interior fittings of a well-appointed house; another, with a pump and fountain in operation; a third, with men at work on various kinds of painting, marbling, and writing; and a fourth decorated with ornamental wall-paper, illustrating the paperhanging branch.

Carpenters and Joiners.—Exhibits:—Lurry containing model of church, with men working; and one with model of a joiner's shop, with men engaged in various kinds of work.

Bricklayers.—About 80 took part. Men engaged turning arch on lurry; lurry with trade tools.

Brickmakers.—About 150 took part. There were three lurries, on which members of the trade showed the various processes of manufacturing bricks, including pressing and burning.

Paviors and Flaggers.—These were the Corporation *employés*. Exhibits:—Model street, designed by Mr. Duthie, 18 ft. long by 7 ft. 6 in. wide, and arranged on the scale of 2 in. to 1 ft.; the foot-walks thus representing a width of 12 ft. each, and the carriage-road, 45 ft. The road was paved with stones procured from quarries in England, Ireland, Scotland, and Wales. The borders of the platform were decorated with the royal and borough arms. The weight of the model was about three tons and a half, and was drawn by four of the finest horses belonging to the Corporation, on the largest lurry belonging to the London and North-Western Railway Company. Three apprentices, mounted on the leading horses, carried the Royal Standard. About 80 took part.

Plasterers.—Number, about 180, each man wearing an apron bearing the coat of arms of the craft.

This procession was preceded by one illustrative of the textile industries of the town.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

4,074. D. Jouls, Walton. Heating baths of dwelling-houses, &c. Aug. 25, 1882.

4,077. J. F. Wright and G. E. Wright, Birmingham. Gas stoves. Aug. 25, 1882.

4,090. W. Thornburn, Boroughbridge. Appliances for heating and warming. Aug. 26, 1882.

4,112. W. M. Brown, London. Baths. (Com. by W. W. Rosenfield, New York, U.S.A.) Aug. 29, 1882.

4,142. H. J. Haddan, London. Door locks. (Com. by O. Belger and F. Preller, Hanover.) Aug. 30, 1882.

4,153. E. Edwards, London. Carpet-fastener. (Com. by J. A. Wilmot, Riverside, New Brunswick.) Aug. 31, 1882.

4,165. W. R. Lake, London. Steam and hot water apparatus for supplying heat to dwelling-houses, &c. (Com. by E. F. Osborne, Saint Paul, U.S.A.) Aug. 31, 1882.

NOTICES TO PROCEED

have been given by the following applicants on the dates named:—

August 29, 1882.

1,458. L. A. Groth, London. Composition for rendering wood, &c., uninflammable. (Com. by H. R. P. Hosemann, Berlin.) March 27, 1882.

1,975. T. E. Bladon, Birmingham. Ventilators and chimney cowls. April 26, 1882.

2,015. G. Hurdle and W. Davie, Southampton. Opening and closing of window-sashes, &c. April 28, 1882.

2,080. W. Porter, Lee. Apparatus for testing cement, &c. May 2, 1882.

2,829. R. R. McKee, Kirkcaldy. Water supply and apparatus for flushing drains. June 15, 1882.

3,344. W. S. Laycock, Sheffield. Self-acting window-blind apparatus. July 14, 1882.

3,416. T. J. Baker, Newark. Chimney-tops or ventilators. July 18, 1882.

3,486. J. Leather, Liverpool. Ventilating apparatus. July 22, 1882.

Sept. 1, 1882.

3,371. H. A. Williams, Lincoln. Pulleys for window-blind rollers, &c. July 15, 1882.

ABRIDGMENTS OF SPECIFICATIONS.

Published during the Week ending Sept. 2, 1882.

324. H. M. Ashley, Knottingley. Kitchen-ranges. Jan. 23, 1882. Price 6d.

The bottom and sides of the oven are made of a waved form to allow of contraction and expansion. A sliding door is fitted between the fire and the chimney to send the draught under the oven when required. A passage is made below the hearth to allow air to pass to the bottom of the grate.

344. S. H. Bevan, Neath. Bonding roll roofing tiles. Jan. 24, 1882. Price 2d.

The tile is made approximately square, and the roll is carried up to the overlapping tile. (*Pro. Pro.*)

353. P. J. Davies, London. Water-closets, &c. Jan. 24, 1882. Price 2d.

Two syphons are so arranged that the water in the pan stands at a higher level than the water in the first syphon. (*Pro. Pro.*)

355. W. J. Doubleday, London. Bottom gratings or bars of fireplaces, &c. Jan. 24, 1882. Price 2d.

These are fitted in a frame so made as to be able to fall down and allow the ashes to slide off. (*Pro. Pro.*)

* Compiled by Hart & Co., Patent Agents, 28, New Bridge-street.

360. W. R. Lake, London. Supporting, balancing, and adjusting window-sashes. (Com. by P. W. Blythe, Boston, U.S.A.) Jan. 24, 1882. Price 6d.

A groove is made in the side of the sash, in which is fitted a tube. Inside this is a coiled spring, one end of which is fixed to the sash and the other to the frame. The dividing beads of the sashes are covered with india-rubber.

379. W. Wright, Plymouth. Flush-cisterns for water-closets, &c. Jan. 25, 1882. Price 6d.

A syphon is combined with a ball-valve and a starting-valve and passage. The cistern is filled by the ball-valve, and when the handle is pulled the starting-valve is opened. The rush of water that passes down the discharge-pipe draws with it the air contained in the syphon, and starts the syphonic action that empties the cistern.

413. B. L. Thompson, London. Protecting roofs, walls, &c. Jan. 27, 1882. Price 4d.

The roof or wall is covered with plates of iron or tin which are coated with vitreous material on both sides. Cloth or paper, &c., may be placed between plates and the roof or wall. The plates can be ornamented as required.

438. J. Imray, London. Manufacture of decorating paper. (Com. by A. Cottais, Paris.) Jan. 28, 1882. Price 4d.

The paper is prepared with a layer of fixed white made up with solution of gum arabic. The design, made with coloured fatty ink, is laid on this, and covered with insoluble varnish. Unsized paper is then glued on, and the first paper removed. The design is then applied to the wall, &c., and the unsized paper removed.

449. J. W. Brown, Leamington. Kitcheners or cooking ranges and cooking grates. Jan. 28, 1882. Price 2d.

The ovens are ventilated by perforations in the lower part of the door through which air passes into a box in which it is heated, thence to the oven, whence it escapes through a valve-box in the crown of the oven to the smoke-flue. (*Pro. Pro.*)

975. J. R. Nottingham, Washington, U.S.A. Composition for the manufacture of artificial stone. (Com. by A. Pelletier, Washington, U.S.A.) Feb. 28, 1882. Price 4d.

Cement or asphaltum is mixed with sand or broken stone, and an oxide and a chloride of any base or metal. These materials are well mixed together while hot.

RIGHT OF SUPPORT BY ADJOINING WALLS.

FEOFFEES OF ST. OLAVE, JEWRY, *v.* FINN AND METROPOLITAN BOARD OF WORKS.

THIS was a motion before Justice Day, sitting as Vacation judge, to restrain the removal of buildings and struts supporting flank walls. The plaintiffs were the owners of the Essex Tavern, and the defendants of the Bull's Head, in the neighbourhood of Houndsditch, and between them supporting struts had, it was stated, stood for forty years. A magistrate's order had been issued under the Metropolitan Building Act for the demolition of the walls of the Bull's Head as dangerous to the public. It had also become necessary to remove the structure, as the Board of Works were making a new street in the locality. The premises respectively were on the City boundary; but the Essex Tavern, being within it, was amenable to the jurisdiction of the Commissioners of Sewers, and could not be condemned until October next, when that body would again meet. On behalf of the plaintiffs it was argued that they had acquired an easement to the support the Essex had had from the other property; that the magistrate's order did not extend to the pulling down of the latter, but only to the making good of defective walls, to the satisfaction of a surveyor, and that whatever the defendants might do must be done without prejudice to the plaintiff's rights. On behalf of the defendants it was argued that they had no alternative but to obey the order which had been made against them.

Mr. Fischer, Q.C., appeared for the plaintiffs; Mr. Methold for the defendants.

His lordship could not possibly allow the defendants' house to be pulled down under the circumstances to the injury of the other, and therefore granted an interim order to restrain their doing so until the second motion day in November next.

Statue to the late Alexander Macdonald, M.P.—At the Miners' Conference held last week at Manchester, Mr. T. Burt, M.P., presiding, it was unanimously decided to entrust the execution of the above statue, which is to be of Sicilian marble, to Messrs. J. Whitehead & Sons, of Westminster, whose model was selected from amongst twenty-four in an open competition. The statue is to be 7 ft. in height, and will, when executed, be erected in front of the Miners' Hall, Durham.

THE NEW MUNICIPAL BUILDINGS FOR GLASGOW.

EXHIBITION OF SKETCH DESIGNS.

THE exhibition of some of the sketch designs submitted in the preliminary competition for the Glasgow Municipal Buildings was opened on Saturday last, and will remain open until the 14th inst. The exhibition has been arranged by the Glasgow Institute of Architects, to whom the Town Council have given the use of the upper gallery in the Corporation Buildings in Sauchiehall-street. Screens have been erected, on which the designs are shown, and in this way, while the work of the architects is properly displayed, the pictures on the walls are not interfered with. In all, forty-nine architects are represented in the exhibition, and as several of them send in more than one set of drawings, these are fifty-four in number.* Of members of the profession in Glasgow, eighteen have contributed their sketch designs to the present exhibition. London architects are next in strength, their contingent numbering twelve; Edinburgh follows with four, and Manchester with three. Other cities and towns have one representative each, namely,—Alloa, Aberdeen, Birmingham, Bradford, Barnsley, Belfast, Leith, Dundee, Halifax, Kilmarnock, Leeds, and Sheffield.

The exhibition is, no doubt, as the *Glasgow Herald* observes, an interesting one, though from the figures we have given it will be seen that not half of the competitors have responded to the appeal of the promoters of the exhibition, probably because they take our view of the matter, viz., that the decision of the professional assessor (Mr. Charles Barry) having been generally accepted by the competitors as satisfactory, any review of the preliminary sketch designs can now serve no useful purpose.

THE PRESTON GUILD AND THE OPENING OF A NEW RAILWAY.

THE celebration of the Preston Guild this week has been accompanied by the opening of a new railway between Preston and Southport. The line is designated the West Lancashire Railway, and the opening of the new line will materially reduce the distance between the two towns. The old route is circuitous, and twenty-two miles in length, whilst the distance between Preston and Southport by the West Lancashire route is only fifteen miles, proceeding along the coast of the river Ribble, and bringing the two towns within from twenty minutes to half-an-hour's ride of each other. By a branch from the main line, crossing the valley of the Ribble, a short distance from Preston, the West Lancashire line will be connected with several of the manufacturing towns on the east side of the county, the company having obtained running powers over several portions of the Lancashire and Yorkshire system, extending to those towns. The new line is carried across the River Ribble into Preston by a massive girder bridge in six divisions, and on Friday week the line was inspected by General Hutchinson, the Board of Trade Inspector. The first trial trip over the bridge was made early in the morning. The train, which consisted of first, second, and third class carriages, was drawn by a heavy engine, and amongst the passengers were Messrs. Fox and Brunlees, the engineers-in-chief; Mr. Thursby, the resident engineer; Messrs. Braddock & Matthews, the contractors; Mr. Gilbert, the manager; and many others. The train returned to Southport, at twelve o'clock, to meet General Hutchinson, accomplishing the distance in half an hour. It shortly afterwards left again for Preston, for the purposes of the inspection. Four large and powerful engines were used to test the bridge over the river Ribble. The engines stood upon the bridge, and ran across it five times at full speed, and the deflection was only a quarter of an inch. The whole of the line proved to be satisfactory, and it was passed by General Hutchinson. It was opened for traffic on Monday, and has daily during the week brought large numbers from Southport, who are attending the Guild festivities. At Preston and Southport two large and commodious stations are in course of erection, both structures being exactly uniform in architectural design.

* In the competition, 125 sets of sketch designs were sent in, by 110 competitors.

RAILWAY CLOCKS.

SIR,—No doubt to the denizen of the "Empire on which the sun never sets," the sun is the great clock, and "railway time" is simply a mechanical necessity of 1882, from rapid transactions of trade, &c. Any boy knows this who looks up at Bennett's in Cheapside; but railway time affects every social relation of life, like the Post-office does. Two of your correspondents have written on this subject, and it seems the present clocks of all the companies suffer from "draughts," "damp," and "oscillation." I am not an expert, but humbly submit, sir, could not these difficulties be got over? Many would argue that the minimum of oscillation is when clocks, &c., are fixed to walls, &c., or on terra-firma, but would it not be possible (at small cost) to fix every railway clock, wherever placed, in a second strong case of metal or oak, lined with ¼-in. vulcanised lining? In this case there might be an apparatus on the binnacle, "ship-lamp," or "endless joint" principle, the clock itself to be attached above and to this by hook, screw, or otherwise. Railway train or "earth tremor," or such like, would surely not affect this arrangement as much as a firm fixture,—that is, of course, always provided that the pendulum proper is not affected by this isolated or pendulous treatment. I apprehend not. Then if this minimises the shaking, the double case and lining will cure the draughts and damp.

En passant, that picture discovery from Pompeii is simply marvellous! (the "Solomon's judgment on the true mother"), because a few years ago the religious world feared science, but Bibical knowledge has been strengthened by science.

LAKEMAN HERBERT.

FOG SIGNALS.

SIR,—Will some one of your readers give me particulars as to the cost of fog-signalling on the railways in this country, as I am unable to procure sufficient particulars from their balance-sheets?

LECTOR CONSTANS.

SCHOOL BOARD SCHOOLS.

Felling and Felling Shore (*Heworth*).—Three groups of schools are at present in course of erection to meet the deficiency of school accommodation in the Heworth School Board district. Two have been completed, and were opened on Monday last, whilst the third, which is being erected at Windy Nook, will be completed in the course of a few months. The Felling schools are arranged to accommodate 725 children. The building is in two stories, and the characteristic features of the interior are the large number of class-rooms provided, with the facilities that exist for easy and direct supervision by the heads of departments, and the means that are provided to enable all the children to approach and leave their several class-rooms without noise or disturbance to the rest of the scholars. Mr. G. Waddell, of Edinburgh, was the contractor for these schools, and the cost of their erection has been 3,461*l.*, or 5*l.* 5s. per scholar. The schools at the Felling Shore are for infants only, and the work has been carried out by Mr. Alexander Thompson, contractor, of Gateshead. Messrs. Oliver & Leeson, of Newcastle-on-Tyne, are the architects for the three groups of schools.

Lambeth.—A new school in the Lambeth Division of the School Board for London, situate in Mina-road, Old Kent-road, has been opened. The school is built to accommodate 420 boys, a like number of girls, and 558 infants, making in all, 1,398. The site comprises 19,213 square feet, and the cost of the building, independently of the site, is 13,130*l.*, or 9*l.* 7s. 6d. per head. The builder is Mr. C. Wall, of Chelsea, and the architect is Mr. E. R. Robson. The building has a spacious playground at the back, part of which is covered in with an iron roof, to enable the children to take their exercise during wet weather. The playground is the largest open space within a considerable area, and it is hoped that the Board will see their way clear to allow it to remain open to the children of the neighbourhood for a reasonable time after school hours.

Builders' Benevolent Institution.—The dinner in aid of the funds of the above-named Institution will take place at the Freemasons' Tavern, on Thursday, the 2nd of November, Mr. J. T. Chappell, president in the chair.

Books.

Practical Organ Building. By W. G. DICKSON, M.A., Precentor of Ely Cathedral. Second edition. Crosby Lockwood & Co. 1882.

THIS is one of the "Weale's Series" of books, and is intended to afford practical information and instruction to those who wish to follow the very interesting employment of building an organ for themselves. The writer, of course, does not, in a book of this kind, go into all the refinements of mechanism adopted in modern large organs, such as pneumatic lever action, pistons, &c. These are not necessary in a small organ, and cannot be satisfactorily made without more elaborate mechanical resources than an amateur can usually afford to have at his command. The action shown in the diagrams is the usual action adopted in ordinary organs of moderate size, and the parts are sufficiently shown in the diagrams to enable any one with a capacity for using tools and understanding drawings to work from them. We can hardly say the same in regard to the pipe diagrams and descriptions, which are not by any means so clear as might be; and we doubt whether any one coming to the book with no previous knowledge of the principles and practice of making organ pipes would be able to make one from the information and illustrations here given. The diagrams are too small in scale, and do not explain themselves sufficiently. We are aware that the low price put on the "Weale's Series" books renders elaborate diagrams impossible, in view of economical considerations. The publishers have done what they could, no doubt, but it is hardly sufficient for the purpose. But in one or two cases there is a defect in the method of drawing also, as in the section of the foot of a wooden pipe (fig. 3), where portions which are separate pieces are drawn in section as if they were cut out of the solid.

In the main, however, the author seems to be well up in the practical part of his work; but, after all, the end and object of organ-building is a musical and not a mechanical one, although we have observed that with not a few persons who indulge in private organ-building the mechanical interest seems entirely to obliterate the musical object of the work. Those who go into amateur organ-building on this ground, of course, have their reward; but to those who look also to the musical ends for which organs are supposed to be constructed, our advice to those about to build small organs would be in the same brief terms as *Punch's* well-known advice to those about to marry. The genuine qualities of the organ as a musical instrument are, to our thinking, never realised except when the instrument is on a tolerably large scale. Little organs bring into prominence all the characteristic defects of the organ and minimise its beauties; and if small organs for sitting-rooms are built, some of the recommendations made by the precentor of Ely (whose musical notions seem as old-fashioned as those of cathedral precentors almost proverbially are) should be carefully eschewed. We will mention, however, one in which we are disposed to support him, the rather because it is one in which, as he himself says, he is likely to find very few persons to agree with him,—that is, in the recommendation that when, in small church organs, only two keyboards can be afforded, the second keyboard should be not, as usual, a "swell" organ, but a "choir" organ. Variety of tone and the highest qualities of organ effect are far better attained by the bright and varied tones of the pipes standing free in the usual form of "choir organ," than by shutting up pipes in a box and letting them sound through shutters occasionally opened and closed. The swell is an expressive adjunct to the organ, but its importance has been much overrated in England (where it was invented) and its use much abused; and we are glad to support Mr. Dickson in his suggestion on this head. But in other points his recommendations are painfully old-fashioned. He speaks of stops being made to draw in halves, treble and bass, a proceeding which is utterly useless, and which none but a hopelessly muddle-headed builder would ever think of adopting nowadays; it is found only in old English organs, built when people knew no better. But, still worse, the author not only recommends the system of "grooving" one stop into another, but even speaks of it as if it were the natural and inevitable way of building small organs. Grooving, it may here be explained, is an operation used when there is

supposed to be not room enough or not money enough to have some particular stop complete, and so the lower octave of pipes, perhaps, which should belong to that stop, is omitted, and the lowest octave of sounds is borrowed from the pipes belonging to another stop, which are thus made to do double duty. Now, we beg to point out (and we speak with the advice of those who are competent judges of the subject) that this practice is, from a musical point of view, simply detestable, and is one of the worst of the old prevalent vices of English organ-building, which are now happily getting disused. To any persons possessed of ordinary common sense it must need only very slight musical knowledge to perceive that such a process not only breaks the continuity of tone in a stop, but it leads to the result that when the stops are used together, the lowest octave, which ought if anything to be the strongest and firmest in tone, is the weakest, having only one set of pipes against two in the upper octaves. Every one who looks at an organ,—or, we should rather say, listens to it,—from a musician's point of view, would, we are assured, tell Mr. Dickson and his readers that it is far better to omit a stop altogether than to make up a sham list of stops by such a wretched makeshift as grooving; and it is a pity that any book on the subject should have been put forth recommending such a practice, unless the object of organ-building, in the author's view, is merely to exercise a talent for joinery, without consideration of the ultimate musical result.

We fear the frontispiece, also, which gives a view of a small organ built by the author, suggests other criticisms more directly from our own point of view. The organ is represented as placed under a low arched organ-chamber, the front pipes only projecting from the mouth of the cavern. This, as has been more than once pointed out in the *Builder*, is the worst position that an organ can be placed in. An organ ought to have free space all round for the sound to develop; nothing militates against its tone so much as cooping it up in a closet in this way; and, besides, it is very desirable that it should be in a position where there is plenty of light, for darkness means the unseen accumulation of dust and dirt, and increased difficulty in inspection and repairing. This, again, ought to seem a matter of mere common sense; and yet architects and clergy go on smothering organs in what they call "organ-chambers," as this were the only orthodox way of treating the instrument.

A Hand-Book and Guide to Preston. By WM. POLLARD. Preston: H. Oakey, Fishergate. 1882.

CARE has been taken to provide the large number of persons visiting Preston this week with an inexpensive and compact little hand-book. Mr. William Pollard has done his work very satisfactorily, and has given a history of the town as well as a clear and comprehensive account of the various buildings and the environs.

VARIORUM.

MESSRS. LONGMANS, GREEN, & Co. announce the first number of a new Magazine, to be continued monthly, under the title of *Longman's Magazine*, each number consisting of from 100 to 128 pages, price 6d. The articles will in most cases be signed by the contributors, and the editor will be personally answerable for the opinions of the anonymous writers only. A strong list of writers is given.——"*The Footsteps of St. Paul in Rome*" is an admirable little memoir by S. Russell Forbes (of Rome), treated from an archæological point of view. It is published by Thos. Nelson & Sons, London. ——The September number of *Belgravia* is a good one. The serial story in it, "All Sorts and Conditions of Men," by Walter Besant and Jas. Rice, increases in interest.——In the *Gentleman's Magazine*, a chapter headed "An Author at Home" gives some account of the private life of Mr. Charles Reade, and shows him to be of a liberal turn of mind.——Cassell & Co. have commenced the issue of a pictorial edition of "The Arabian Nights Entertainment," to be completed in sixteen sixpenny parts. It will contain 400 illustrations by Gustave Doré and other well-known artists, and promises to be a remarkable book of its kind. ——From "Our Houses and How to make them Healthy" we get the following paragraph on "Sanitation in the Eighteenth Century":—

Though it is somewhat difficult to arrive at any very precise estimate of the sanitary condition of the great towns at the commencement of the eighteenth century, sufficient records exist to show that a steady increase must have taken place both in personal and public cleanliness. The average of deaths from colic and dysentery decreased with remarkable activity, so much so that in the last decennial period of the century the annual average of deaths from these causes was little more than a tenth of what it had been in the first one. The cause of this decrease is attributed by a writer at the beginning of the present century to the improvements which took place in all the great towns, in the manner of living, but particularly in respect to cleanliness and ventilation. In many provincial towns, however, the sanitary arrangements were but little in advance of those in the Middle Ages. In the year 1855 Mrs. Mary Bartlett, aged 105, described to Mr. Edwin Chadwick how, within her own recollection, it was dangerous to walk the streets of Exeter after dark "for fear of being befouled by what was thrown out of the windows, and during rain by the water-spouts from the unguttered houses." The old custom of strewing the floor with rushes also survived until the middle of the eighteenth century. In seaside towns sand did the work of rushes. Brussels carpets were introduced from Tournay in 1745, and by the year 1760 the floors of all respectable houses were carpeted. The subject of ventilation appears to have received little or no attention in this country until the close of the seventeenth and the early years of the eighteenth centuries.

Miscellanea.

Disfiguring Buildings.—The Canterbury magistrates have been called upon to investigate a case in which the Dean and Chapter of the Cathedral prosecuted a visitor to the city for an act of wanton mischief in the nave of that building by scratching his name on one of the piers. It was stated that it was a very common practice among strangers who visited the cathedral to write or scratch their names upon the columns and other conspicuous parts of the stonework, but hitherto the authorities had been unsuccessful in their attempts to make an example of one of the offenders. The present defendant was caught in the act by a gentleman who had undertaken the part of amateur detective to the Chapter. Mr. H. G. Austin, the cathedral seneschal, said the Chapter did not press for a heavy penalty, but desired merely a conviction as a warning to others. A great amount of damage had been done in different parts of the cathedral, especially in the north-west transept, and the authorities were determined to put a stop to it. The Bench fined the defendant 1*l.* 8s. 6d., with the alternative of fourteen days' imprisonment. It is to be hoped this incident will act as a warning to other foolish people.

Appointment of Surveyors and Architect for Ripon Diocese.—At a meeting of the archdeacons and rural deans of the diocese of Ripon, held under the presidency of the bishop, at the Palace, Ripon, it was resolved that Mr. Ralph Nicholson, of 55, Parliament-street, Westminster, and Mr. C. R. Chorley, of Headland-buildings, 15, Park-row, Leeds, be elected diocesan surveyors of dilapidations for the diocese of Ripon, under the provisions of the Ecclesiastical Dilapidations Act, 34 and 35 Vict., c. 43, and that they continue in office for three years from this date on the same terms as heretofore. It was also resolved that Mr. J. Oldrid Scott be elected diocesan architect for the diocese of Ripon, in the place of the late Mr. G. E. Street, at a salary of 50*l.* This resolution is subject to confirmation by the general meeting of the society next spring.

Fleet-street Improvements.—On Tuesday, says the *City Press*, tenders were received for erecting the new building in Fleet-street (at the corner of Chancery-lane) for Messrs. George Attenborough & Son, from the designs of Messrs. Archer & Green, of Buckingham-street, Strand. Those sent in are as follow:—Messrs. Mowlem & Burt, 11,962*l.*; Messrs. Perry & Co., 11,000*l.*; Messrs. Colls Brothers, 10,697*l.*; Messrs. Holland & Hannen, 10,680*l.*; Messrs. Bywater, 10,123*l.* The latter tender was accepted, and the works will be forthwith commenced.

The Parkes Museum.—The Council of the Parkes Museum have just acquired new premises in Margaret-street, Cavendish-square, to which the museum is to be removed from University College as soon as the alterations and additions which are now being made, under the direction of Mr. Mark H. Judge, A.R.I.B.A., are completed. The new museum will consist of a central hall, suitable for meetings and lectures; a library; and corridors, all lighted from the top, and well suited for exhibition purposes. The meetings and lectures on sanitary and other matters connected with the health of the people, which were only occasional while the museum was at University College, will form a permanent feature of the institution when it is re-opened in Margaret-street. Capt. Douglas Galton, C.B., F.R.S., presided at the last meeting of the Council, when a letter was read from Mr. Thomas Twining, of Twickenham, offering to contribute a special donation of 100*l.* towards the expenses incidental to the change of quarters. It is expected that the museum will be re-opened before Christmas.

Burnley.—The Burnley Board of Guardians, on the 31st ult., adopted the plans of Mr. T. Bell, architect, for the new cottage-homes and schools at the workhouse. The plans show four cottage homes, capable of accommodating twenty-six children each. These cottage homes are to be erected on the plot of land now used as a meadow, in front of the main building. The school will be erected between two cottage homes, and will be capable of accommodating 110 children. The boys will occupy the home nearest the turnpike road, and the girls will be placed on the Infirmary side. Each home is intended to be under the superintendence of a "mother," and the children will do the whole of the work in connexion with each block, except the washing and baking. On the ground-floor there are to be day-room, dining-room, kitchen, scullery with pantry, lavatory, and store-room. On the second floor there will be two dormitories,—one to accommodate 16 and the other 10 children, and the nurses' bedrooms are so placed as to overlook both dormitories.

An Achievement.—Mr. S. C. Hall, F.S.A., recently entertained a number of ladies and gentlemen in Plymouth with a discourse on the remarkable men and things he has known. Admission was by invitation ticket issued by the Mayor, and such was the desire to hear Mr. Hall that more tickets were issued than would fill the room. All were not able to come; but as many came as rendered the room uncomfortably warm. The Mayor (Mr. C. F. Burnard) presided. After a most interesting address, delivered in a strong audible voice, and extending in delivery over two hours and a half, Mr. Hall concluded by expressing his great interest in the Plymouth Free Library, and his desire to promote its usefulness. A cordial vote of thanks, moved by Mr. I. Latimer, and seconded by Mr. R. C. Serpell, followed by a similar recognition of the Mayor's services in presiding, brought to a close an entertainment which gave great pleasure to those who were present.

Another London Theatre Burned Down. Early on Wednesday morning the Philharmonic Theatre, Upper-street, Islington, was completely destroyed by fire. The theatre was closed about twelve o'clock on Tuesday night, and at ten minutes to one o'clock a policeman on duty saw smoke issuing from the main building. By about three o'clock the whole of the theatre,—stage and auditorium,—was nearly burnt out, and most part of the roof was burnt off. The property and dressing rooms, which are apart from the main building, were not materially damaged. The cause of the disaster has not been ascertained. The theatre thus destroyed was originally built as a music-hall, and was opened about twenty-two years ago. If we mistake not, it had only lately undergone reconstruction to a material extent.

A Pastoral Staff.—A pastoral staff, prepared by the diocesan architect, has been presented to the Bishop of Bath and Wells. It is designed to illustrate the histories of Glastonbury, Bath, and Wells in their connexion and independence, the main imagery of the crook applying to the name of Wells. The plan of the crook is hexagonal. Engraved upon the staff are the words, "Thy rod and Thy staff comfort me." The Earl of Cork made the presentation, and Archdeacon Denison presented an address. The Dean of Wells and Mr. R. H. Paget, M.P., also took part in the proceedings.

The Borough Surveyorship, Swansea.—At a special meeting of the Swansea Town Council, on the 30th ult., the election of a borough surveyor took place. From the large number of 100 candidates for the appointment, the special committee had selected seven, as follows:—Mr. George Bell, aged 32, assistant engineer to the Swansea Corporation for the past seven years; 2, Mr. P. B. Coghlan, aged 40, engaged under the London School Board and in private practice; 3, Mr. W. A. de Pape, aged 35, Tottenham; 4, Mr. J. M. Thomas, 32, assistant surveyor to the Swansea Corporation; 5, Mr. W. H. Wardle, 32, assistant surveyor, Bolton; 6, Mr. Winter, chief assistant surveyor, Liverpool; 7, Mr. R. H. Wyrill, aged 31, of Leeds, in private practice. It was arranged that the candidates should be called into the chamber *seriatim*, the testimonials of each being read before he was seen. This being done, all the candidates being called in and questioned, with the exception of Mr. W. A. de Pape, who was not in attendance, and so was disqualified, the result of the voting was as follows:—For Mr. Wyrill, 14; for Mr. Bell, 5; for Mr. Thomas, 3. On the motion of Mr. Cady, seconded by Mr. Burnie, Mr. Wyrill was elected.

New Clock and Carillons for Bombay University.—A native of Bombay, Mr. Premchund Rogchund, having munificently provided the necessary funds for a large clock and carillons for Bombay University, the India Government entrusted the work to the following firms:—The bells to Messrs. John Taylor & Co., of Loughborough, Leicestershire, founders of the new ring of twelve bells for St. Paul's Cathedral, and of Great Paul; the iron bell-frame to Messrs. Westwood, Baillie, & Co.; and the clock and carillon machinery to Messrs. Lund & Blockley, of 42, Pall-mall, by whom the whole of the work has been erected and put in operation in London, preparatory to its shipment to Bombay. The bells are sixteen in number, in the key of C (twelve consecutive and four half-notes). The largest weighs about three tons, and the whole peal about twelve tons, and they are contained in a wrought-iron bell-frame, weighing about seven tons more.

Modern Mosaics.—At the cost of Mr. Bateson de Yarburgh, the reredos of St. Paul's Church, Heslington, has recently been richly embellished by the introduction of a series of beautiful mural decorations carried out in Venetian glass mosaic. The work in question comprises the decoration of nine panels at the east end of the church, and the subjects represented in the four principal panels are full-length figures of the Evangelists, with emblematic devices and inscriptions. The figures are in colour, and stand out prominently from the rich gold background which surrounds them. The smaller panels are treated with floriated designs, and the central panel contains an ornamental Maltese cross. The work, which has given great satisfaction, has been carried out by the well-known Venice and Murano Glass and Mosaic Company, of 30, St. James-street, London.

Electric Lighting.—At the last meeting of the Fulham District Board of Works, the seal of the Board was affixed to an agreement with the West Middlesex Electric Lighting Company, empowering the company to lay wires enclosed in pipes under the footways, throughout the parishes of Fulham and Hammersmith,—the distance of roads in the district being thirty-seven miles, and containing 29,000 houses. It is proposed to erect, at suitable points, central stations upon a large scale, within the two parishes, for the purpose of generating electricity. Gramme dynamo machines will be used for this purpose. For street lighting Brockie's arc lamps will at present be fixed, and for shops and private houses, the Improved British Incandescent Lamp.

Boring Operations with Boart.—A correspondent writes:—"In the course of some boring operations which have recently been carried on by the Government of the Cape of Good Hope in the search for coal, it occurred to the geologist in charge to make trial of native boart in lieu of the Brazilian carbonado, which had, until then, been employed. The experiment proved a complete success. The last six crowns used were of 3 in. diameter, set with boart. It was found that these bored through 1,100 ft. of sandstone and shale, part of it exceedingly hard, being indurated by contact with intrusive rock. The average boring per crown was therefore 183 ft., and the last crown is nearly as good as new."

Proposed Municipal Buildings at Hyde. At a meeting of the Hyde Town Council, on Monday night, a memorial, signed by 2,262 ratepayers, was presented, urging the Council, in consequence of the unsatisfactory termination of the public meeting lately held to discuss the scheme for erecting municipal offices for the borough, at a cost of 8000*l.*, to reconsider and abandon the scheme, a large majority of the constituents being opposed to it. The Council, however, were of opinion that it would be to the interest of the present and future ratepayers that the scheme should be proceeded with. Mr. J. W. Beaumont, Manchester, has been appointed the architect, and Greenfield House will be taken down to make room for the new building.

The Coalbrookdale Company have taken premises at Nos. 43 and 44, Holborn Viaduct, as London showrooms, for their well-known manufactures, and purpose to keep there a selection of the principal articles in grates, stoves, ranges, gates, railings, &c., made at their foundry in Shropshire. The rooms will be under the charge of Mr. Henry Ch. Eyres. The Coalbrookdale Company, as among the very first of the manufacturing firms who, after the Great Exhibition of 1851, sought to bring in art to the elevation of their works, well deserve a warm recognition at our hands.

Dorking Sewerage.—At a meeting of the Dorking Local Board, held on the 29th ult., a report was received from the Sewerage Committee, stating that the Committee had examined the report of Messrs. Smith & Austin, the consulting engineers to the Board, for the sewerage of the town, and recommending that the same be approved and adopted, and that the engineers named be instructed to proceed with the preparation of the working plans and sections. This was agreed to.

Art in Liverpool.—On Saturday last, over 1,500 persons attended the "private view" of the collection of pictures and sculpture in this season's autumn exhibition, held in the Walker Art Gallery, under the auspices of the Liverpool Corporation, and ninety-one pictures were sold, realising 1,328*l.* The collection comprises 826 oil paintings, 741 water-colour drawings, and 38 pieces of sculpture. Sir F. Leighton's "Phyrne" occupies a prominent place in the exhibition.

Royal Commission on Technical Instruction.—The members of this Commission have not been idle during the past month. Considerable progress has been made in the collection and arrangement of the vast amount of information collected by the Commissioners during their visit to France, Germany, Austria, Switzerland, and Italy. They have recently been engaged in pursuing their investigations here and abroad.

Newport (Mon.).—The clergy of Holy Trinity parish, having held services for years past in small rooms lent or hired for the purpose, feel it desirable that a permanent and commodious building should be erected. A central and very suitable site has been promised by the Tredegar Wharf Company, and plans, prepared by Mr. E. A. Lansdowne, of Newport, have been approved by the committee. The total cost will be from 2,500*l.* to 3,000*l.*

The Jablochkoff Electric Light Company have taken large premises on the Albert Embankment, to be used as a manufactory for their carbon candles, as a warehouse, and as a lighting centre. They are also about erecting a building on the Victoria Embankment for the purpose of more effectually carrying out their contract with the Metropolitan Board of Works.

The Fylde Union Sanitary Authority have obtained designs from several civil engineers for sewering the town of Poulton, and the districts of Breck, Skippool, and Little Poulton, and the scheme of Mr. Alfred M. Fowler, Manchester, has been accepted.

TENDERS

For the erection of warehouses and timber store, Bunhill-row, for Mr. W. Walker. Messrs. Davis & Emanuel, architects, 2, Finsbury-circus, City. Quantities by Mr. Fredk. Downing, 7A, Whitehall-yard:—

John Mowlem & Co.	£13,300 0 0
Higgs & Hill	13,180 0 0
Colls & Son	12,700 0 0
B. E. Nightingale	12,531 0 0
John Grover	12,450 0 0
G. S. Pritchard	12,417 0 0
Thos. Boyce	12,400 0 0
Ashby Bros.	12,376 0 0
McLachlan & Sons	12,334 0 0
Ashby & Horner	12,250 0 0
W. Brass	12,087 0 0
E. Lawrance	11,967 0 0
Sabey & Son	11,340 0 0

For the erection of a villa residence, on the Burgess-hill Park Estate, Sussex, for Mr. Thos. Cracknell. Messrs. R. S. Hyde & F. W. Hyde, architects, Brighton:—

Patching & Son	£1,928 0 0
Hollands	1,780 0 0
Lockyer	1,747 0 0
Garrett Bros.	1,595 0 0
Dean	1,550 0 0
Downer	1,490 0 0
S. Norman, Burgess-hill (accepted)	1,450 0 0

For building new stores, dwelling, and offices, Broad-street, Teddington (exclusive of shop fronts and fittings), for Messrs. C. & A. Deayton. Mr. Thos. R. Richards, architect, 17, King-street, Cheapside. Quantities by the architect:—

T. Boyce	£2,247 0 0
J. Piller	2,215 0 0
F. Sims	2,175 0 0
Sweet & Loder	2,143 0 0
Harris & Wardrop	2,074 0 0
H. J. Whitman	2,033 0 0
J. F. Collinson	1,970 0 0
T. & W. Hickinbotham (accepted)	1,965 0 0
T. J. Messom (withdrawn)*	1,875 0 0

* Error in casting.

For new organ-gallery, chapel-keeper's room, and other additions, Upton Chapel, Lambeth-road. Mr. Chas. Henry Searle, architect, 12, Southwark-street. Quantities by the architect:—

Little	£2,073 0 0
Falkner	1,898 0 0
Rider & Son	1,658 0 0
L. H. & R. Roberts	1,647 0 0
Ford & Sons	1,625 0 0
Nightingale	1,623 0 0
Wilson & Exton	1,605 0 0
Higgs & Hill	1,577 0 0

For proposed hospital, St. Paul's Cray, Kent, for the Committee. Mr. G. St. Pierre Harris, architect. Quantities by Mr. C. Stanger:—

		Deduct for wall and fence.
Wood	£2,857 0 0	£454 0 0
Ottway	2,582 0 0	420 0 0
Wiltshire	2,570 0 0	470 0 0
Grover	2,488 0 0	498 0 0
Taylor & Parfitt	2,457 0 0	487 0 0
Taylor & Son	2,386 0 0	441 0 0
Crossley	2,410 0 0	477 0 0
Douglas Payne	2,343 0 0	436 0 0
Ormond & Son	2,367 0 0	478 0 0
Baldwin	2,380 0 0	500 0 0

For rebuilding professional residence, St. John's-hill, for Dr. J. H. Bertillow. Mr. Wm. West, architect, 36, Southampton-street, Strand:—

W. Perrin (accepted)	£850 0 0

For sundry works at the Blackstock Hotel, Finsbury Park. Mr. Wm. West, architect:—

J. Oldis (accepted).

For the erection of farm buildings on the Imberhorne Estate, East Grinstead, for Mr. Edward Blount, C.B. Mr. S. W. Haughton, architect, East Grinstead. Quantities by the architect:—

Pledge, East Grinstead	£1,175 0 0
Waters, Forest-row	1,141 12 0
Godly, East Grinstead	1,100 0 0
Charlwood Bros., East Grinstead*	885 0 0

* Accepted.

For the erection of a lodge on the Imberhorne Estate, East Grinstead, for Mr. Edward Blount, C.B. Mr. S. W. Haughton, architect, East Grinstead. Quantities by the architect:—

Penn Bros., Pembury	£625 0 0
G. Beard, East Grinstead	539 0 0
J. Waters, Forest-row	535 0 0
Charlwood Bros., East Grinstead	524 0 0
J. H. Godly, East Grinstead (accepted)	489 0 0

Accepted for villa residence, Bank Field, Kendal, for Mr. T. C. Wilson. Mr. Robt. Walker, architect, Kendal:—

E. Hutton (walling, &c.).
E. Nelson (joiner's work).
J. Robinson (plastering).
C. Nowell (plumbing).
J. Hine (painting and glazing).
H. Goulding (slating).

Accepted for Wesleyan Chapel and caretaker's residence at Bowness. Mr. R. Walker, architect:—

G. H. Pattinson (walling, &c.).
J. S. Parker (joiner's work).
C. Palmer (plastering).
T. Russell (plumbing).
F. G. Croft (painting and glazing).

Accepted for villa residence at Windermere, for Mr. B. A. Irving. Mr. R. Walker, architect:—

Martindale & Co. (walling, &c.).
J. Thompson (joiner's work).
H. B. Armstrong (plastering).
The Windermere Gas Co. (plumbing).
Heaton Bros. (painting and glazing).

For Conservative Club, Maidstone. Mr. Hubert Bensted, architect, Maidstone. Quantities by Mr. Thomas Ladds, Tunbridge Wells:—

Pryer & Co.	£4,084 0 0
Avard	3,949 0 0
Naylor	3,937 0 0
Clements (accepted)	3,794 0 0
Cox Bros.	3,790 0 0

For rebuilding Monkswood Church, Monkswood. Mr. E. H. Lingen Barker, architect:—

J. Morgan, Dingestow	£904 7 0
Coleman Bros., Chaxhill	879 0 0
J. Cook, Hartlebury	825 0 0
Davies & Johnson, Pontypool	618 0 0
W. Davies, Usk	600 0 0
E. Giles, Little Mill (accepted)	593 0 0

For main sewer, Wokingham:—

Pollard & Co., London	£235 0 0
Collier, Reading	200 0 0
J. Allcock, Camberley	199 17 0
J. Botterill, Reading	190 0 0

For building additions to the Wilts and Dorset Bank, for the Wilts and Dorset Banking Company, Calne. Mr. Fred. Bath, Crown Chambers, Salisbury, architect. Quantities supplied:—

A. Livermore, Tetbury	£1,300	0	0
George Chivers, Calne	1,204	0	0
R. B. Mullings, Devizes	1,102	0	0
Thos. Beazley, Calne (accepted)	1,044	0	0

For building shop and dwelling-house in Catherine-street, Salisbury, for Mr. Samuel Parker. Mr. Fred. Bath, architect. Quantities supplied:—

John Wort, Salisbury	£975	10	0 !
H. J. Kite, Salisbury	945	3	0
George West, Salisbury	942	7	6
P. Tryhorn, Salisbury	929	10	0
Wm. Roles, Salisbury	896	2	0
Edward Abley, Salisbury	855	10	0
E. Young & Sons, Salisbury	815	0	0
Michael Walker, Salisbury*	475	0	0 !

* Architect resigned rather than take this tender for the work.

For building additions to the Wilts and Dorset Bank, Melksham, for the Wilts and Dorset Banking Company. Mr. Fred. Bath, architect:—

F. & W. Long, Bradford-on-Avon	£550	0	0
Blake & Davis, Melksham*	542	18	8

* Accepted subject to a slight reduction.

For building nine cottages on Bickerley-common, for the Ringwood Cottage Building Company, Limited. Mr. Fred. Bath, architect to the Company:—

E. Young & Sons	£2,606	0	0
Jenkins & Son	2,450	0	0
Tuck & Carley	2,056	0	0
W. E. Alexander	2,033	0	0
H. J. Kite	2,023	0	0
John Wort	1,966	0	0
Edward Abley	1,925	0	0
M. Rowland	1,805	0	0
C. Davis	1,760	0	0
A. Head*	1,650	0	0
H. Barrow	1,575	0	0

* Accepted, being the lowest after deducting sum allowed for old materials.

For proposed additions to the Grammar School, Maidstone, Kent. Mr. E. W. Stephens, architect, Maidstone:—

Naylar & Son	£1,477	0	0
Elmore	1,410	1	0
Avard	1,395	0	0
Cox Bros.	1,378	0	0
E. Vaughan	1,366	0	0
Wallis & Clements	1,297	0	0
Pryer & Co., Maidstone (accepted)	1,297	0	0

For repairs at No. 14, Moscow-terrace, and No. 1, White Post-lane, Hackney, for Mr. J. Grist. Mr. H. I. Newton, architect, 27, Great George-street:—

Sainy	£157	10	0
Dowling	129	0	0
Green & Sons	107	0	0

For shop fittings in York-road, Battersea, for Messrs. Simson & Errington. Mr. H. I. Newton, architect:—Simpson (accepted).

For the erection of shops and houses at Stepney, for Mr. W. P. Barnes. Messrs. Hammack & Lambert, architects:—

Bangs & Co.	£18,690	0	0
Hearle & Son	18,200	0	0
Cardus	17,900	0	0
David King & Son	17,300	0	0
Killby	17,190	0	0
Boyce	17,100	0	0
Johnson	16,990	0	0
Wood	16,983	0	0

For the construction of roads, sewers, &c., to the first portion of Fitzgerald Estate, Church End, Finchley, the property of Mr. Charles Bates. Mr. Walter Hall, surveyor:—

Ford & Everett, Westminster	£1,190	0	0
P. G. Pound, Bow-road	1,187	0	0
Beadle Bros., Erith	1,040	0	0
McDowell & Dawson, Stoke Newington	940	0	0
J. Pizzey, Hornsey (accepted)	848	10	0

Accepted for rebuilding warehouse, Chapeltown, Halifax. Mr. T. L. Patchett, architect, Halifax:—
J. S. Carey & Son, Halifax (masons' work).
John Atkinson, Halifax (carpenter and joiner).
John Firth, Halifax (slater, &c.).
George Walker, Halifax (plumber and glazier).

For kerbing and channelling Rose-street, in the township of Urmston, for the Barton-upon-Irwell Sanitary Authority. Quantities supplied by Mr. John Price, C.E.:—

M. Naylor, Hulme	£254	4	0
Snape & Sons, Eccles	253	2	0
J. Oakes, Kearsley	250	11	6
W. H. Worthington, Manchester	243	14	1
G. Gusworth, Moss Side	242	6	4
E. Bird, Choriton	240	0	0
J. Randall, Weaste	239	12	6
J. Mackay, Hereford (accepted)	235	14	2
S. Holt, Miles Platting	202	12	6

For additions to house, stabling, and entrance-lodge at Kemnal-road, Chislehurst, for Mr. W. M. Walker. Mr. George Lethbridge, architect. Quantities by Mr. C. H. Goode:—

Patman & Fotheringham	£5,392	0	0
Lowe	4,993	0	0
Ashby Bros.	4,880	0	0
Higgs & Hill	4,760	0	0
Adcock	4,740	0	0
Harris & Wardrop	4,699	0	0

For blue brick paving and kerbing and channelling at Loughborough. Mr. Frank Baker, C.E., Town Surveyor:—

Gibbons, Leicester	£1,012	6	4
Lee, Leicester	953	4	4
Barker, Loughborough	948	5	4
Brown, Northampton	929	3	1
Knight, Loughborough	911	11	5
Cordon, Nottingham	897	15	0

Mr. Knight's tender has been accepted for the blue brick paving, and Mr. Cordon's for the kerbing and channelling.

Tavern, Storey's Gate.—In the list of tenders for rebuilding the Storey's Gate Tavern, Westminster, published by us last week (p. 323), the tender of Mr. Thos. Spearing, of Bennerly-road, Wandsworth-common, which amounted to 3,237*l.*, was, by the inadvertence of our correspondent, omitted.

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T. H. (the clause may be got over by facing the chimney breast with 9 in. work instead of 4½ in.).—A. P. di C.—A. T.—T. C. B.—W. & Son.—A. F.—E. H. L. B.—W. H.—D. K. & Son.—C. H. G.—E. H. M. A.—E. M. U.—W. W. L.—M. M.—T. L. P.—J. B.—A. W.—F. D.—T. & P.—M. & L.—W. W.—S. W. H.—Mr. B.—T. S.—C. H. S.—E. W. M.—J. St. C. M.—S. & A.

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